THE EFFECT OF RESISTANCE ON INTELLIGENCE TEST SCORES OF YOUNG CHILDREN

By

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I

INTRODUCTION

Examiners of young children have been concerned with the factor of resistance since the time when young subjects were used in standardizing the Binet Scale. Describing the difficulties involved in testing three-year-olds, Binet and Simon say:

> Many children of this age remain silent and will not reply even to questions which they understand. This mutism is partly caused by timidity. . . . The silence of others is partly caused by ill-will, stubbornness or malice.[1]

So prevalent was this tendency to resistance in the mental test situation considered that Levy and Tulchin selected the administration of the mental test as a convenient means of arousing and studying resistance patterns in young children.[2]

Reynolds, in a study of negativism, selected a setting similar to that employed in administering the psychological test, and among other situations chosen to incite resistance, two of the Binet tests were employed.[3]

In both of these studies it will be observed that the investigators were interested mainly in the study of resistance as such, the type and degree manifested at increasing age levels, and the age at which the peak is reached, rather than in its effect upon intelligence test scores.

Kuhlmann listed timidity, obstinacy, indifference, and overconfidence as the chief obstacles to maximum effort, with obstinacy as the attitude most difficult—sometimes impossible—to overcome.[4]

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[1] Binet, Alfred, and Simon, Th., *Development of Intelligence in Children,* p. 93.

[2] Levy, David M. and Tulchin, Simon H., "The Resistant Behavior of Infants and Children," *Journal of Experimental Psychology*, 1925, Vol. 8, p. 223.

[3] Reynolds, Martha May, *Negativism of Pre-School Children*, pp. 28-29.

[4] Kuhlmann, Frederick, *A Handbook of Mental Tests,* p. 66.

Goodenough, concerned with the effect of emotional attitudes upon intelligence test performance, has devised rating scales for the measurement of shyness, negativism, distractibility, and general coöperativeness manifested by children two, three, and four years old during the administration of the Kuhlmann-Binet test.[5]

Stutsman has attempted to meet such resistance by a device which corrects for refusals, and in a recent publication presents data on the number of complete and partial refusals manifested by children from one and a half to five years of age during the administration of the Merrill-Palmer tests.[6]

Nelson presents findings on resistance, its effect on intelligence test ratings, and its relationship to other factors studied.[7]

Goodenough, Stutsman, and Nelson report less resistance during the mental test than the previous literature in the field would lead us to expect. With a better understanding of young children and improved technique for securing coöperation, the amount of resistance manifested has probably decreased. There still remain, however, a considerable number of children who fail to give full coöperation at all times. In scoring the Kuhlmann-Binet Scale, the examiner is faced with the problem of whether or not to list the test results of such children as incomplete on the scale, or to marked refused tests as failures. If this problem could be solved, a careful consideration of the directions for giving and scoring the separate tests would reveal further problems:

1. Responses to certain tests now scored as failures should probably be considered refusals. For example: silence counts as failure on the comprehension test at the fourth year level on the Kuhlmann-Binet scale. Stutsman says,

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[5] Goodenough, Florence L., *The Kuhlmann-Binet Tests for Children of Preschool Age*, pp. 104-117.

[6] Stutsman, Rachel, *The Mental Measurement of Preschool Children*, pp. 125-126.

[7] Nelson, Janet Fowler, *Personality and Intelligence*, Child Development Monograph, No. 4.

If a child has answered to any of the questions, failure to respond to the others is always scored a failure.[8]

2. Whether a test may or may not be repeated, the number of repetitions and the extent to which a child may be urged vary with the separate tests, if directions are followed. Among the twenty-one tests from the second through the fourth year on the Kuhlmann-Binet scale, there are specific directions for urging and repeating ten, such as "Repeat and urge if necessary," "Repeat once or twice"; while with another the direction is, "In all cases urge by repeating or changing the form of command if necessary to get a correct response."[9] The following are examples of the amount of urging allowed on ten of the tests occurring between the eighteenth and thirty-fifth month levels on the Merrill-Palmer Scale:

> If the child does not respond at once, urge him.
> Give the illustration again if the child hesitates.
> If the child hesitates or fails to get the idea, continue.[10]

3. The number of times directions may be repeated in order to facilitate the child's comprehension of the tests depends on the subjective judgment of the examiner. For example, Kuhlmann lays great stress on the importance of being sure that the subject understands what he is to do. He says,

> Some of the tests aim directly at the determination of the subject's ability to comprehend directions. In the tests in which this is not the aim, this factor should be eliminated by making sure that he understands. This must be done by repeating the instructions or by varying them in the way that occasion demands. So long as the task to be done remains the same, this procedure does not affect the results. It is a matter, however, about which the greatest caution needs to be exercised, lest by these variations in the procedure the nature of the test is thereby changed.[11]

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[8] Stutsman, Rachel, *op. cit.* Questions 24 to 30 month level on Merrill-Palmer Scale.

[9] Kuhlmann, Frederick, *op. cit.*, pp. 93-101.

[10] Stutsman, Rachel, *op. cit.*, pp. 152-170.

[11] Kuhlmann, Frederick, *op. cit.*, pp. 69-70.

As long as the child responds readily, all is well with the test procedure. When he does not respond, it may be that he is shy or negativistic, that he cannot do the test, or that he does not understand. If tests never to be repeated were omitted from the scale or clearly designated, and the maximum number of times the remaining tests may be repeated whenever a child fails to respond were stated, and, furthermore, if all tests not attempted were marked as refused, conditions would be more nearly uniform throughout. Complete freedom as to number of times a test may be repeated may mean that the opportunities given the child to respond will vary with the time at the examiner's disposal. In testing young children, the examiner should adjust to the child in such matters as varying the length of the test period to suit his individual needs and allowing him freedom between tests and time to adjust to the strange situation. The actual method of presenting the tests, when once the examiner has attracted the attention of the child, however, may be as rigorously followed with young children as with older ones.

STATEMENT OF THE PROBLEM

The aim of the study was to investigate these problems:

1. To what degree does resistance, as measured by tests refused, influence intelligence test scores of three-year-old children?
2. To what extent and by what means can such resistance be overcome?
3. What is the relation of resistance to mental age, intelligence quotient, and the difficulty of the test?
4. Which tests are most frequently refused?

Resistance is here defined as any form of behavior other than attempting a test within thirty seconds after it has been presented.

The plan of the present investigation was to administer the Kuhlmann-Binet and Merrill-Palmer Scales and to observe and study the various aspects of resistance manifested.

II

SELECTION OF SUBJECTS

The group studied was composed of one hundred children, fifty boys and fifty girls, ranging in chronological age from 34.5 to 37.5 months, with an average deviation of eight-tenths of one month from the third birthday. Tables I and II give the mental ages and intelligence quotients of this group as

TABLE I

Distribution of Cases by Mental Age and Sex

Mental Age (Months)	Merrill-Palmer			Kuhlmann-Binet		
	Boys	Girls	Total	Boys	Girls	Total
66	0	1	1	0	0	0
64–65	0	0	0	0	0	0
62–63	0	0	0	1	1	2
60–61	0	0	0	1	0	1
58–59	1	0	1	0	0	0
56–57	0	2	2	3	0	3
54–55	0	1	1	4	8	12
52–53	2	1	3	2	1	3
50–51	1	3	4	4	5	9
48–49	4	3	7	12	13	25
46–47	7	5	12	7	6	13
44–45	2	6	8	3	0	3
42–43	6	7	13	4	7	11
40–41	7	5	12	2	5	7
38–39	10	9	19	3	0	3
36–37	4	4	8	4	3	7
34–35	4	3	7	0	1	1
32–33	2	0	2	0	0	0
Total	50	50	100	50	50	100
Median	41.43	43.14	42.31	48.33	48.46	48.40
Mean	42.40	44.08	43.24	47.92	47.64	47.78
S.D.	5.57	6.42	6.07	6.15	5.75	5.95

TABLE II

Distribution of Cases by Intelligence Quotient and Sex

Intelligence Quotient	Merrill-Palmer			Kuhlmann-Binet		
	Boys	Girls	Total	Boys	Girls	Total
175–179	0	1	1	1	0	1
170–174	0	0	0	0	1	1
165–169	0	0	0	0	0	0
160–164	0	1	1	1	0	1
155–159	1	2	3	3	3	6
150–154	0	0	0	3	4	7
145–149	0	1	1	1	3	4
140–144	2	1	3	6	4	10
135–139	1	2	3	8	8	16
130–134	7	6	13	6	8	14
125–129	5	2	7	5	3	8
120–124	3	6	9	4	4	8
115–119	6	7	13	4	6	10
110–114	4	8	12	2	2	4
105–109	10	9	19	3	0	3
100–104	5	3	8	3	4	7
95– 99	1	1	2	0	0	0
90– 94	3	0	3	0	0	0
85– 89	2	0	2	0	0	0
Total	50	50	100	50	50	100
Median	115.00	117.86	116.54	130.33	130.75	132.60
Mean	116.10	122.06	119.05	132.40	132.75	132.86
S.D.	15.23	16.27	16.27	16.63	15.86	16.25

measured by the Kuhlmann-Binet and Merrill-Palmer Scales. For comparison with the Kuhlmann-Binet, the Merrill-Palmer intelligence quotients were also computed. Stutsman gives three ways of interpreting the score made on the Merrill-Palmer tests: by finding the mental age corresponding to the score, the standard deviation value of the score, the percentile value of the score; she does not, however, recommend the use of the intelligence quotient. Table III shows the distribution of cases by chronological age and by sex.

As may be seen from Table II, the intelligence quotients ranged from 100 to 175 with a mean of 132.86 and a standard

TABLE III

Distribution of Cases by Chronological Age and Sex

Chronological Age (Months)	Boys	Girls	Total
37.5–37.9	6	7	13
37.0–37.4	7	5	12
36.5–36.9	13	7	20
36.0–36.4	10	5	15
35.5–35.9	4	9	13
35.0–35.4	5	9	14
34.5–34.9	5	8	13
Total	50	50	100

deviation of 16.25 as measured by the Kuhlmann-Binet Scale. When computed separately for boys and girls, the Kuhlmann-Binet intelligence quotient range, means, and standard deviations were within a fraction of one point of being the same for both sexes. The Merrill-Palmer mental ages and intelligence quotients for the group were considerably below the Kuhlmann-Binet rating. There was also a tendency for the girls to rate higher than the boys on the Merrill-Palmer Scale. These points will be discussed later.

Of the one hundred children composing the group tested from June, 1929, to May, 1930, seventeen children were obtained through the coöperation of the nursery school at Cornell University, six through the Washington Child Research Center in Washington, D. C., five through the nursery school at Vassar College, and the remaining seventy-two from the list referred to the Child Development Institute of Teachers College, Columbia University. When sixty-six of the seventy-two children had been tested, the record showed that twice as many boys as girls had been referred. Boys were excluded thereafter. This group also showed a preponderance of Jewish children.

None of the group studied had been tested before this experiment. With the exception of the five children who had been

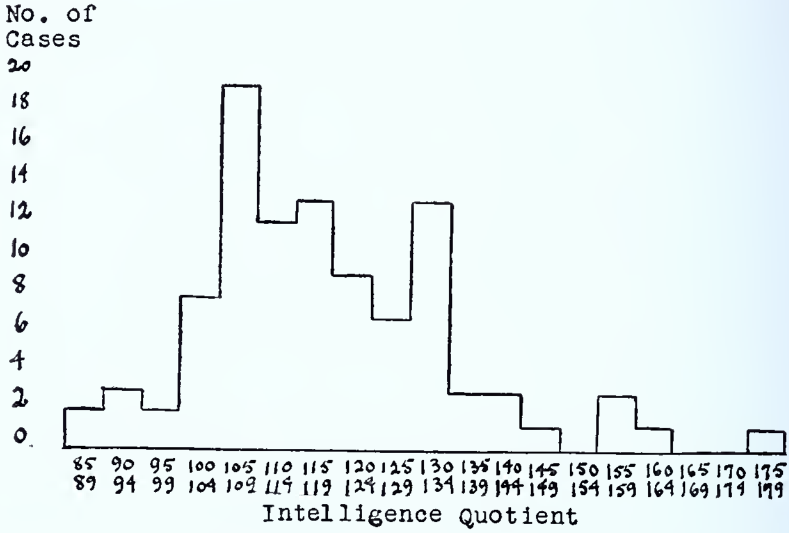

Diagram I. Distribution of intelligence quotients on the Kuhlmann-Binet Scale —total group. (Data from Table II.) M=132.86; S.D.=16.25; Md=132.60.

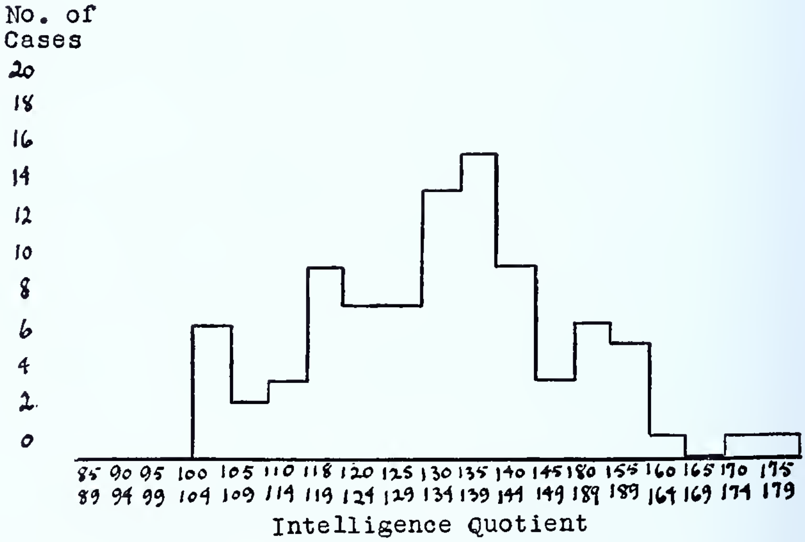

Diagram II. Distribution of intelligence quotients on the Merrill-Palmer Scale —total group. (Data from Table II.) M=119.05; S.D.=16.27; Md=116.54.

TABLE IV

Number of Parents of the 100 Children in Each Category of the Barr-Taussig Scale

Occupation	Number of Fathers						Number of Mothers					
	Boys	Per Cent	Girls	Per Cent	Total	Per Cent	Boys	Per Cent	Girls	Per Cent	Total	Per Cent
I Professional	29	58	36	72	65	65	19	38	27	54	46	46
II Managerial	17	34	12	24	29	29	1	2	1	2	2	2
III Clerical	2	4	0	0	2	2	8	16	5	10	13	13
IV Skilled Labor	0	0	0	0	0	0	0	0	0	0	0	0
V Semi-Skilled Labor	0	0	0	0	0	0	0	0	0	0	0	0
VI Unskilled Labor	0	0	0	0	0	0	0	0	0	0	0	0
Housewives							22	44	17	34	39	39
Dead or No Information Given	2	4	2	4	4	4						

enrolled in the Vassar nursery school for a few weeks, none of the children had attended nursery school.

Announcements were made to those connected with the centers from which the children were obtained and to classes of students in Teachers College that the staff psychologist of the Child Development Institute would, for a limited length of time, administer tests to children falling within the required age range; that the parents would receive reports of the tests, and their coöperation would be appreciated. A report of the tests was sent to the parents of each child, briefly characterizing the child's behavior in the test situation, comparing his ratings on the two scales, and giving his mental level as average, superior, or very superior, as designated by Kuhlmann.

Though this experiment made it necessary to bring the child to the laboratory on two to four successive days, not one child was lost through failure of the parents to coöperate in bringing the child, and only one child was excluded because of illness.

It is interesting to observe the range and mean intelligence quotients of the children obtained by voluntary application from the sources from which these children came. An adaptation of the Barr-Taussig Rating Scales used by Goodenough[12] was applied to the fathers of these children. Where the mothers were engaged in occupations which definitely fell into these categories, they were also grouped accordingly, though the scale was not devised for the purpose of classifying women. Table IV gives this distribution.

From Table IV it may be seen that sixty-five per cent of the fathers are classed in Professional Group I, twenty-nine per cent in Managerial Group II, two per cent in Clerical Group III, and that no group below the Clerical is represented. It is interesting to note the fact that sixty-one per cent of the mothers of these children are employed, and that forty-six per cent of them fall into Professional Group I.

This is a fair sample of how children volunteered by parents as subjects for testing tend to represent a select social group, and hence represent an intelligence level higher than average.

The results here reported can apply only to children at or above 100 intelligence quotient.

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[12] Goodenough, F., *op. cit.*, Appendix, p. 133.

III

PROCEDURE

The Kuhlmann-Binet and the Merrill-Palmer Scales were used throughout the experiment. Approximately half of each scale was administered on the first day and half on the second day, in the following order:

Boy A: *first* day, Merrill-Palmer followed by Kuhlmann-Binet;
second day, Kuhlmann-Binet followed by Merrill-Palmer.
Boy B: *first* day, Kuhlmann-Binet followed by Merrill-Palmer;
second day, Merrill-Palmer followed by Kuhlmann-Binet.

This order was followed independently for boys and girls.

The experiment was limited to one test period a day on each of four successive days. Refused tests were presented twice during the initial period and three times during each subsequent period, if they were not accepted sooner.

In presenting the tests, the examiner attracted the attention of the child and gave the command once only for each test. When the child did not attempt the test within the thirty seconds allowed, the refusal was ignored; the examiner simply went on with other tests, and returned later to the one that had been refused. The child's first response was recorded whenever he did not attempt a test. Verbal responses were recorded verbatim; "silence" was recorded when the child was silent and still; if a motor response was made, the activity was recorded in such terms as "walks away," "pushes material away," "goes after other material." These notations were made on the test blank opposite the test, and included both initial and subsequent refusals. A separate record was kept for each day.

Since children may have special abilities, as demonstrated by passing specific tests considerably above their mental age, especially on the Kuhlmann-Binet Scale, which shows an unusual amount of scatter, response was required for every test within the range necessary for adequate measurement of the child, regardless of how far it was above his mental age. The responses, "I can't" and "I don't know," frequently made by young children, may mean failure for some and simply non-compliance for others; the distinction is not always made with certainty by the most experienced examiners. Such responses were therefore counted as refusals throughout this experiment.

As has been previously stated, initial and subsequent resistances were counted for each separate test. Since there are some tests on the scale which contain several items, a special rule had to be enforced to provide approximately equal conditions for all parts of the scale. In a test such as Family Name, when the child is simply asked to give his full name, there is only one item to be met. On the other hand, in the case of a test such as the Comprehension test, when a child must respond to several items, there is presented an opportunity for more than one instance of resistance. In cases of this kind, when the child did not respond to the first item of a series, such as the Definitions test, the examiner went back to this same item in subsequent presentations until a response was secured, and after this, responses to the other items were usually readily obtained. In this way the child could receive only one resistance score on any particular test, whether the test contained one or several items. If, as seldom occurred, the child accepted a first item and refused later items, the same procedure of allowing only one resistance score for a separate test was followed.

On the Merrill-Palmer Scale the greatest variation in the opportunities to resist a separate test occurs on verbal tests; the Questions test offers ten such opportunities, whereas the Action Agent test offers a maximum of twenty. In order to make these tests more comparable to the other tests of the scale as measures of resistance, the number of refusals was counted on the first six of these two tests only—the number necessary to pass the test at the lowest level at which it appears on the scale. A separate analysis of refusals has been made which includes those occurring with the ten Questions and the fourteen Action Agent questions not completely included here. Seguin Form Board and Wallin Peg tests A and B, each of which is repeated three times, are considered separate tests and are designated separately; for example, Wallin Peg 1, 2, and 3.

In administering the tests the examiner always began at the third year level for both scales and went forward until approximately half the tests had been presented. If the child did not base at the third year, the tests below this level were given on the second day. If all tests at the third year were passed, then the first four tests of the fourth year were not administered until the second day. According to this plan, some easy tests as well as the most difficult remained for presentation on the second day.

On the third and fourth days all that remained to be presented were the tests which had been refused. The children who returned on these days were, therefore, only the children who had still failed to attempt one or more tests. These children were returning to be faced with tasks which had been refused three or more times. In order to incite new interest and to vary this experience, supplementary material, chosen to elicit the spontaneous activity of the child, was interspersed between the refused tests. This material consisted of two picture books, one containing pictures of animals, the other containing pictures representing various activities from the beginning to the end of the young child's day, ten large wooden beads and a shoe string, "alphie" and one-inch colored blocks, colored crayons and paper, a doll, and a starlight sparkler.

In order to make transition from the test material to the supplementary material easy for the child and to keep the test period uniform throughout, a standardized procedure similar to that employed in presenting the tests was followed in presenting the supplementary material. This material was concealed in a box beside the examiner. The interest of the child controlled the selection made. If a child especially liked one piece of material, it was used over and over again instead of introducing different material. The starlight sparkler proved to be exciting, and was used only with a few children after interest in other material had been lost.

All tests were administered in the psychological laboratory under optimum conditions. Ample time was allowed between appointments with children for testing in order that no child might be kept waiting. Each child was given time to look around and explore this strange environment before removing his wraps. In order not to interrupt the test and also to provide an opportunity for increased familiarity with his surroundings, he was first taken to the toilet. The diminutive nursery school toilet seats proved, incidentally, to be of much interest to the children. The child was then invited to come to see the "games," the term used to designate the tests. If he hesitated, a yellow toy duck, pulled by a string, often aroused sufficient interest for the child to follow spontaneously or to take the string from the hand of the examiner and pull the duck into the laboratory. A doll, instead of the duck, was sometimes used to overcome self-consciousness. When the child became interested in the doll, he was invited to bring it in to see the games. It was then suggested that the doll sit on the shelf above the child's reach and see how nicely he played the games. The mother or nurse was then asked to leave the room.

Eighty of the hundred children were apparently satisfied and happy when alone with the examiner throughout the test periods. Mothers of five of the children remained throughout all test periods, and fifteen mothers or nurses were present for a few minutes at the beginning of, or at some time during, one or more of the test periods.

From the very beginning the child was commended for effort as well as for success. It was explained to him that we should try all the games just to see how many of them we could do. When he recognized failure, he was told that this game was really for bigger boys but we thought that it would be fun to try to see if we could do it—that he had tried hard, and that was fine.

We do not know to what extent children may be distracted by the dress of the examiner; certainly we find individual differences in the notice taken of dress and beads, and in the remarks made about them. In order to keep the examiner's costume uniform throughout, a dull green or rose smock was worn.

TABLE V

Total Time in Minutes Required for Administering the Kuhlmann-Binet and Merrill-Palmer Scales

	Range in Minutes	Mean	Standard Deviation
Boys	59–124	82.6	10.88
Girls	60–114	81.8	8.83
Total Group	59–124	82.2	9.97

Difference between the means for boys and girls: .8.
P. E. of Difference: 1.34.
$\frac{\text{Difference}}{\text{P. E.}} = .6.$

Table V gives the time required for administering the tests. It will be observed that the time required for administering tests to boys and girls is approximately the same.

THE RELIABILITY OF THE EXAMINER

During preliminary test periods, two observers and a stenographer who had participated in previous studies at the Child Development Institute were introduced to take independent records of the children's responses as a means of checking the accuracy of the records that were being taken by the examiner. During the administration of the Merrill-Palmer and Kuhlmann-Binet Scales five children were observed by the first observer, eight by the second observer, and fourteen by the stenographer. The observers and the stenographer were seated in an adjoining room and observed the child and the examiner through a one-way vision screen. Both observers and the stenographer knew the name of every test of the scales. They were instructed to designate the test refused and the child's first response when he did not attempt it. If the child responded verbally, the motor activity which might accompany it was not recorded; if he did not speak, the type of motor activity was noted—for example, "pounds paper"; when the child was silent and still, the response was recorded as silence. Tests were also designated when the response was inaudible and invisible. Tests thus designated were not checked with the examiner's record. When the records of the two observers and the stenographer were combined, it was found that the children's responses had been invisible three times and inaudible twenty-six times during the total number of test periods observed. Table VI gives the percentage of

TABLE VI

PERCENTAGE OF AGREEMENT BETWEEN OBSERVERS AND EXAMINER AS TO NUMBER AND TYPES OF RESPONSES

	No. of Tests Refused	No. of Verbal Refusals	Verbatim Content of Response	No. of Motor Responses in Refusing	Description of Motor Responses	No. of Silent Refusals
Observer I	57	16	15	26	22	15
Examiner	57	16	16	26	26	15
Per Cent of Agreement	100	100	93.75	100	84.53	100
Observer II	75	20	16	21	18	32
Examiner	72	20	20	20	20	32
Per Cent of Agreement	98.63	100	80	95.24	90	100
Stenographer	165	44	42	62	58	59
Examiner	167	44	44	64	64	59
Per Cent of Agreement	98.8	100	95.4	96.8	90.6	100

agreement between the examiner and the observers introduced at different times, as to number and types of responses.

DISCUSSION OF THE METHOD OF COLLECTING DATA

It seemed important to keep the experiment within two to four successive days in view of the fact that children develop very rapidly at the early age levels. A previous investigation reports a tendency for children to resist more frequently the more difficult tests. If the results of the present study should show a similar tendency, later acceptance might be due to the fact that subsequent growth and experience had made the same tests, previously resisted, less difficult. In limiting the experimental period to a maximum of two to four successive days, growth and experience as factors in overcoming resistance were reduced to a minimum.

The chronological age and the range, mean, and standard deviation of the mental ages as measured by the Kuhlmann-Binet Scale were approximately the same for boys and girls. Since previous studies have shown a tendency for resistance as manifested by preschool children to decrease with increase in mental age, it seemed to be of value, in comparing sex differences with regard to resistance, to have the chronological age and mental age the same for boys and girls. There is some experimental evidence to show that the amount of resistance varies with chronological age, although the studies do not agree on the age at which the peak of resistance is reached. Levy and Tulchin designate the eighteenth month for the girls and the thirtieth month for the boys.[13] Reynolds' results indicate twenty-four months or less;[14] Stutsman's findings show that children from twenty-four to twenty-nine months of age have a tendency to refuse the maximum number of tests.[15]

In administering the two scales, the order was rotated so that each scale might have an equal chance in arousing the interest of the child, since the writer wished to compare the two scales as to amount of resistance evidenced.

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[13] Levy and Tulchin, *op. cit.*, p. 223.

[14] Reynolds, *op. cit.*, p. 120.

[15] Stutsman, Rachel, *op. cit.*, p. 130.

We do not know to what extent the reactions of children may be modified by previous experience of the same kind. We do know that when groups of preschool children are retested, there is a definite tendency for the mean intelligence quotient of the groups to increase on the second test. In order to make the experience uniform for all children, it was therefore decided to include only those who had not been tested before.

IV

MEASURES OF RESISTANCE

Resistance, as previously stated, is here defined as any form of behavior other than attempting the test within thirty seconds after it has been presented. As a whole, resistance has been investigated from two aspects: number of children refusing tests, and number of tests refused. As a first step in answering the questions raised at the beginning of the investigation, we may consider the ways in which resistance has been measured and the results that have been obtained.

Table VII gives the number of children refusing one or more tests of the Kuhlmann-Binet or the Merrill-Palmer Scale and the two scales combined on initial presentation, the number of children remaining resistant at the end of the second and third test periods, and the number of children failing to attempt every test at the end of the fourth and final test periods.

TABLE VII

Number of Children Who Refused One or More Tests of the Kuhlmann-Binet Scale, the Merrill-Palmer Scale, and the Two Scales Combined

Presentation	Test	Boys	Girls	Total
Initial presentation	Kuhlmann-Binet . . .	35	40	75
	Merrill-Palmer	33	35	68
	Combined Scales . . .	41	43	84
At end of test period on second day	Combined Scales . . .	9	8	17
At end of test period on third day	Combined Scales . . .	4	3	7
At end of test period on fourth day	Kuhlmann-Binet . . .	2	2	4
	Merrill-Palmer	0	1	1
	Combined Scales . . .	2	2	4

In order to measure more precisely the resistance manifested by individual children, three resistance scores, which will hereafter be referred to as General Resistance Score, Initial Resistance Score, and Subsequent Resistance Score, have been derived, as follows:

$$\text{General Resistance Score} = \frac{\text{Total number of initial and subsequent refusals of all tests presented}}{\text{Total number of tests presented}}$$

The number of tests necessary to administer in order to obtain a child's mental age may vary with individual children; therefore the number of opportunities to resist will vary accordingly. For this reason, in obtaining the child's mental age, a ratio of initial and subsequent refusals to total number of tests presented is a fairer measure of the amount of resistance manifested by the child than simply a count of the total number of times the child has refused the tests.

$$\text{Initial Resistance Score} = \frac{\text{Total number of initial refusals of tests common to all children}}{\text{Total number of tests common to all children}}$$

$$\text{Subsequent Resistance Score} = \frac{\text{Total number of subsequent refusals of tests common to all children}}{\text{Total number of initial refusals}}$$

It will be observed that the results show a marked tendency for some tests to be refused more frequently than others. It therefore seemed important to obtain, for the individual children, a measure of resistance based on only those tests which had been presented to every child of the group studied. It is recognized that this situation is not the same as one in which only tests common to all children have been administered; but the purpose of this investigation precluded this possibility, and the measure obtained by the method followed is fairly comparable for all children. Initial and subsequent refusals are also measured independently. Within the range of tests covered by the entire group, there were forty-five Kuhlmann-

Binet tests, of which twenty-four were common to all children, and forty-four Merrill-Palmer tests, of which twenty-three were common to all children. Sixty-five initial resistance scores on the Kuhlmann-Binet Scale and fifty-four on the Merrill-Palmer Scale were thus obtained. Children who resisted only the tests at the extremes of the scale were excluded.

It is to be remembered that four children remained at the end of the final test period who refused to attempt three or more Kuhlmann-Binet tests presented, and one child remained who refused to attempt one Merrill-Palmer test presented. The child who remained resistant to the Merrill-Palmer test was also among the four who remained resistant to the Kuhlmann-Binet tests. Thus, at the end of the experiment, there remained four children who had not attempted every test presented on both scales. Since we have no way of knowing what the scores of these four children might have been if resistance had been overcome, these scores have not been included in the analysis and treatment of these data.

Three aspects of resistance have been measured for the individual children by resistance scores, as has been described in the foregoing paragraphs. Of the one hundred children studied, the number earning the three resistance scores and

TABLE VIII

Distribution of Resistance Scores—Kuhlmann-Binet and Merrill-Palmer Scales

	Number of Children	Mean Score	Range	S.D.
Kuhlmann-Binet				
Initial Resistance	65	.143	.04– .48	.074
Subsequent Resistance	51	1.24	.00– 4.78	1.06
General Resistance	71	34.8	5–161	31.54
Merrill-Palmer				
Initial Resistance	54	.113	.05– .53	.061
Subsequent Resistance	41	1.23	.00– 4.5	.95
General Resistance	67	32.6	5–166	33.57

TABLE IX

Comparison of Mean Resistance Scores for Boys and for Girls—Kuhlmann-Binet and Merrill-Palmer Scales

	Mean for Boys	No.	Mean for Girls	No.	Difference B−G	P.E. of Dif.	Dif. / P.E.
Kuhlmann-Binet							
Initial Resistance	.141	28	.144	37	.003	.0127	2.36
Subsequent Resistance ..	1.37	23	1.15	27	.22	.1825	1.22
General Resistance	25.23	33	27.13	38	1.90	4.22	.45
Merrill-Palmer							
Initial Resistance	.117	26	.109	28	.008	.113	.70
Subsequent Resistance ..	1.49	21	1.02	20	.47	.1799	2.60
General Resistance	20.79	33	25.90	34	5.11	4.20	1.22

the range, mean, and standard deviation of these resistance scores may be seen in Table VIII.

In a subsequent section we shall consider the relation of these scores to the mental ages and the intelligence quotients of the children. The difference between the means of the scores for boys and for girls was not found to be significant, as may be seen from Table IX.

V

RESISTANCE AND ITS EFFECT UPON INTELLIGENCE TEST SCORES

THE effect of resistance upon the intelligence test scores of the children in the group who resisted one or more tests but finally accepted all tests has been measured in two ways: (1) by scoring all tests initially refused as failed and estimating the increase in mental age months and intelligence quotient points from initial and subsequent refusals to acceptance for the individual children resisting one or more tests, for the resistant group, and for the total experimental group; (2) by computing the percentage of tests initially refused that were

TABLE X

INCREASE IN INTELLIGENCE QUOTIENT POINTS FROM FIRST TO FINAL PRESENTATION—KUHLMANN-BINET AND MERRILL-PALMER SCALES

Increase in I.Q. Points	Number of Children								
	Kuhlmann-Binet Scale			Merrill-Palmer Scale I*			Merrill-Palmer Scale*		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
25–35	5	2	7	0	2	2	0	0	0
15–24	6	12	18	2	1	3	0	0	0
5–14	12	14	26	22	16	38	1	2	3
1–4	8	6	14	7	7	14	6 −11†	5 −4†	11 −15†
Unchanged ...	17	14	31	19	23	42	32	38	70
Total	48	48	96	50	49	99	50	49	99

* Merrill-Palmer Scale I, not corrected for refusals.

† The minus signs indicate the cases in which the children received credit by the Merrill-Palmer device for correcting for refusals which they should not have received according to the actual results obtained by the procedure followed in the present study.

finally passed, the percentage failed, and the percentage never attempted.

The results in terms of increase in intelligence quotient points for the individuals of the group finally accepting every test appear in Table X.

A method of correcting for refusals has been devised for the Merrill-Palmer Scale; of this device Stutsman says,

> The most satisfactory procedure in correcting for these omissions and refusals, it appeared, was to count as successes all refused or omitted tests below the level of the child's attainment on the whole scale, and to count as failures all occurring above this level.[16]

In a footnote Stutsman acknowledges her indebtedness to L. L. Thurstone for this device, which she says follows his method or is adapted from it.[17]

TABLE XI

INCREASE IN AVERAGE MENTAL AGE AND INTELLIGENCE QUOTIENT FROM FIRST PRESENTATION TO ACCEPTANCE AS RESISTANCE IS OVERCOME—KUHLMANN-BINET SCALE

PRESENTATION	MENTAL AGE (MONTHS)				INTELLIGENCE QUOTIENT			
	Boys 36	Girls 37	Boys and Girls 73	Total Exper. Group 96	Boys 36	Girls 37	Boys and Girls 73	Total Exper. Group 96
1	44.2	42.2	43.2	44.9	122.1	117.4	119.7	124.7
2	44.8	43.7	44.3	45.7	123.8	121.6	122.7	126.9
3	45.8	45.0	45.4	46.6	126.7	125.1	125.9	129.4
4	46.7	45.8	46.3	47.3	129.2	127.3	128.2	131.2
5	46.8	46.1	46.4	47.4	129.3	128.0	128.7	131.5
6	47.0	46.2	46.6	47.5	130.0	128.5	129.2	131.9
7	47.5	46.2	46.8	47.7	131.2	128.5	129.8	132.4
8	47.5	46.2	46.9	47.7	131.4	128.5	129.9	132.5
9	47.5	46.2	46.9	47.7	131.4	128.5	129.9	132.5
10	47.5	46.2	46.9	47.7	131.4	128.5	129.9	132.5
Total Increase ...	3.3	4.0	3.7	2.8	9.3	11.1	10.2	7.8

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[16] Stutsman, Rachel, *op. cit.*, p. 95.

[17] *Ibid.*, p. 93.

The accuracy of thus allowing for refusals was checked in the following way: Merrill-Palmer tests were scored a second time without corrections for refusals. All refusals were scored minus until finally accepted, when they were scored plus if passed. The results of the same test, scored by the two methods, appear in Tables X, XII, and XIII, and may also be compared with the Kuhlmann-Binet results for the same child or children given in Tables X and XI. These results clearly show the advantage of the device used by Stutsman for both individuals and groups.

If we take the two scales together, there were eighty-four children who were resistant to one or more tests on the first presentation. Seven of these children did not improve their scores, since the tests refused were failed, whereas four were excluded because every test was not accepted; for the remain-

TABLE XII

INCREASE IN AVERAGE MENTAL AGE AND INTELLIGENCE QUOTIENT FROM FIRST PRESENTATION TO ACCEPTANCE AS RESISTANCE IS OVERCOME—MERRILL-PALMER SCALE

(Not Corrected for Refusals)

PRESENTATION	MENTAL AGE (MONTHS)				INTELLIGENCE QUOTIENT			
	Boys 36	Girls 37	Boys and Girls 73	Total Exper. Group 96	Boys 36	Girls 37	Boys and Girls 73	Total Exper. Group 96
1	39.8	41.1	40.5	41.3	110.1	114.6	112.4	114.8
2	40.4	41.5	40.9	41.7	111.9	116.4	114.2	116.2
3	40.7	41.9	41.3	42.0	112.9	117.5	115.2	117.0
4	41.2	42.7	42.0	42.5	114.2	119.9	117.1	118.4
5	41.2	42.7	42.0	42.5	114.2	119.9	117.1	118.4
6	41.3	42.7	42.0	42.5	114.4	119.9	117.2	118.5
7	41.4	42.7	42.1	42.6	114.8	119.9	117.4	118.6
8	41.4	42.7	42.1	42.6	114.9	119.9	117.4	118.7
9	41.5	42.7	42.1	42.6	114.9	119.9	117.5	118.7
10	41.5	42.7	42.1	42.6	115.0	119.9	117.5	118.7
Total Increase	1.7	1.6	1.6	.9	4.9	5.3	5.1	3.9

ing seventy-three, and for the ninety-six children accepting every test, the increases in intelligence quotients and mental ages appear in Tables XI, XII, and XIII.

TABLE XIII

INCREASE IN AVERAGE MENTAL AGE AND INTELLIGENCE QUOTIENT FROM FIRST PRESENTATION TO ACCEPTANCE AS RESISTANCE IS OVERCOME—MERRILL-PALMER SCALE

PRESENTATION	MENTAL AGE (MONTHS)				INTELLIGENCE QUOTIENT			
	Boys 36	Girls 37	Boys and Girls 73	Total Exper. Group 96	Boys 36	Girls 37	Boys and Girls 73	Total Exper. Group 96
1	41.7	42.9	42.3	42.7	115.5	119.4	117.5	118.7
2	41.6	42.9	42.3	42.7	115.3	119.6	117.5	118.7
3	41.7	42.9	42.3	42.7	115.5	119.6	117.6	118.8
4	41.6	43.0	42.3	42.7	115.2	119.9	117.6	118.8
5	41.6	43.0	42.3	42.7	115.2	119.9	117.6	118.8
6	41.5	43.0	42.3	42.7	115.1	119.9	117.5	118.8
7	41.5	43.0	42.3	42.7	115.1	119.9	117.5	118.7
8	41.5	43.0	42.3	42.7	115.1	119.9	117.5	118.7
9	41.5	43.0	42.3	42.7	115.1	119.9	117.5	118.7
10	41.5	43.0	42.3	42.7	115.1	119.9	117.5	118.7
Total Increase	−.2	.1	0	0	−.4	.5	0	0

Diagrams III to VI show the average increase, on the Kuhlmann-Binet and the Merrill-Palmer Scales, in mental age and in intelligence quotient for both the resistant group and the total experimental group.

TABLE XIV

PERCENTAGES OF INITIALLY REFUSED TESTS FINALLY PASSED, FAILED, NEVER ATTEMPTED—KUHLMANN-BINET AND MERRILL-PALMER SCALES

	KUHLMANN-BINET	MERRILL-PALMER
Number of Tests Initially Refused	354.00	235.00
Percentage Passed on Later Presentations	58.20	77.87
Percentage Failed on Later Presentations	34.20	21.70
Percentage Never Attempted	7.60	.43

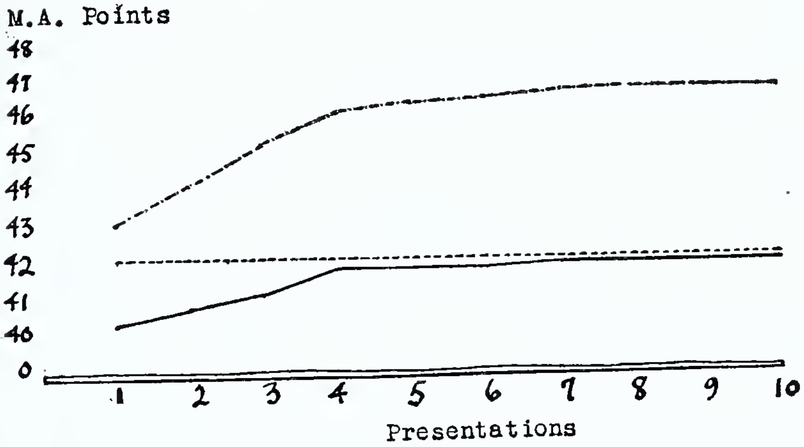

Diagram III. Average increase in mental age for the total experimental group as resistance is overcome. (Data from Tables XI, XII, XIII.)

- - · - - Kuhlmann-Binet Scale

- - - - - Merrill-Palmer Scale

——— Merrill-Palmer Scale (not corrected for refusals)

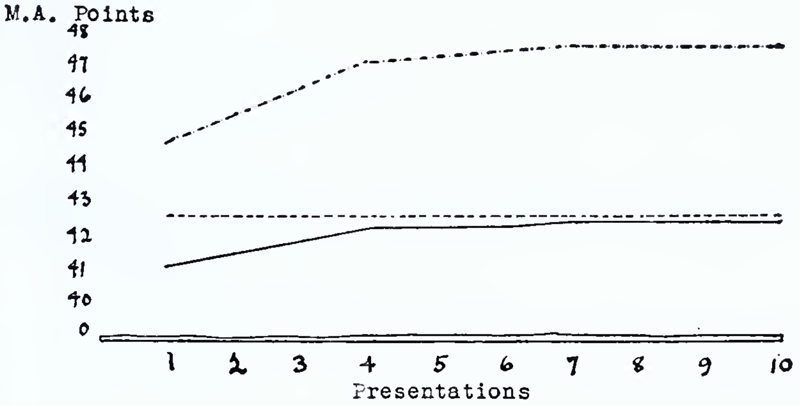

Diagram IV. Average increase in mental age for the resistant group as resistance is overcome. (Data from Tables XI, XII, XIII.)

- - · - - Kuhlmann-Binet Scale

- - - - - Merrill-Palmer Scale

——— Merrill-Palmer Scale (not corrected for refusals)

The number of tests refused and the percentages which were passed, failed, and never attempted, are given independently for the two scales in Table XIV.

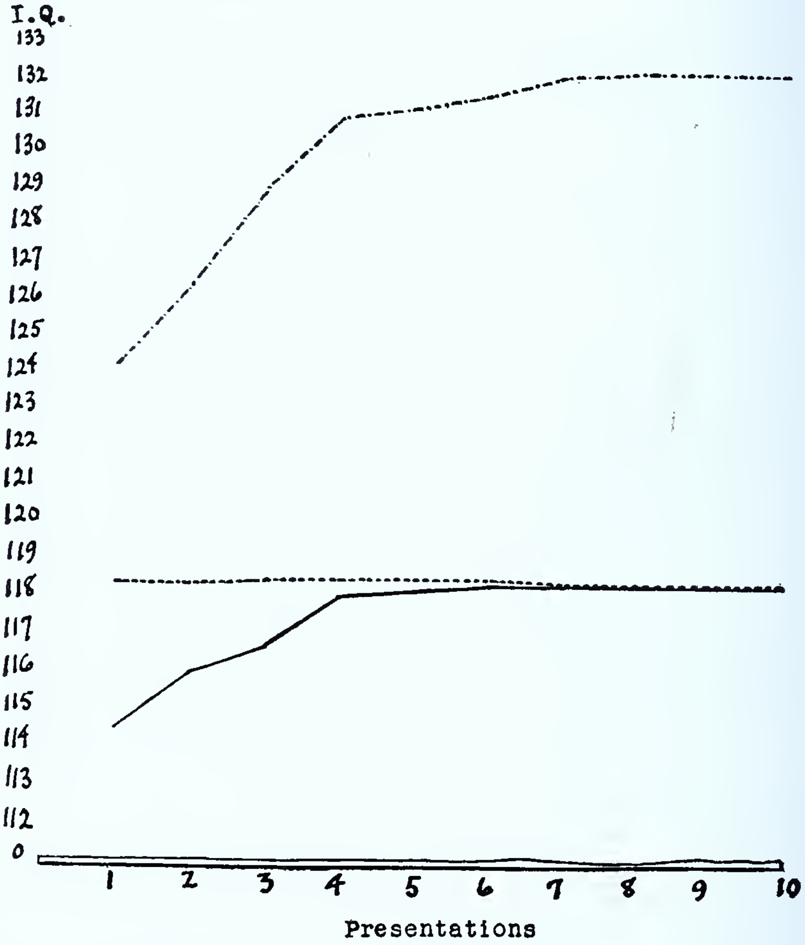

Diagram V. Average increase in intelligence quotient for the resistant group as resistance is overcome. (Data from Tables XI, XII, XIII.)
- - - - - Merrill-Palmer Scale
- · - · - Kuhlmann-Binet Scale
——— Merrill-Palmer Scale (not corrected for refusals)

It will be observed that of the Kuhlmann-Binet tests refused when first presented, fifty-eight per cent were finally passed, whereas of the Merrill-Palmer tests refused when first presented, approximately seventy-eight per cent were finally passed at the lowest level at which they appear on the scale.

This difference between the percentages of refused tests passed on the two scales may be regarded as being due to the difference in construction of the scales rather than as being any real difference as related to resistance. Separate tests of the Kuhlmann-Binet Scale appear at one level only, whereas the same Merrill-Palmer test may score at different levels, according to the time required to complete the test and the errors made. In determining the level at which the test was considered passed on the Merrill-Palmer Scale, in order to make this level constant for all tests, it was arbitrarily decided to use the lowest level.

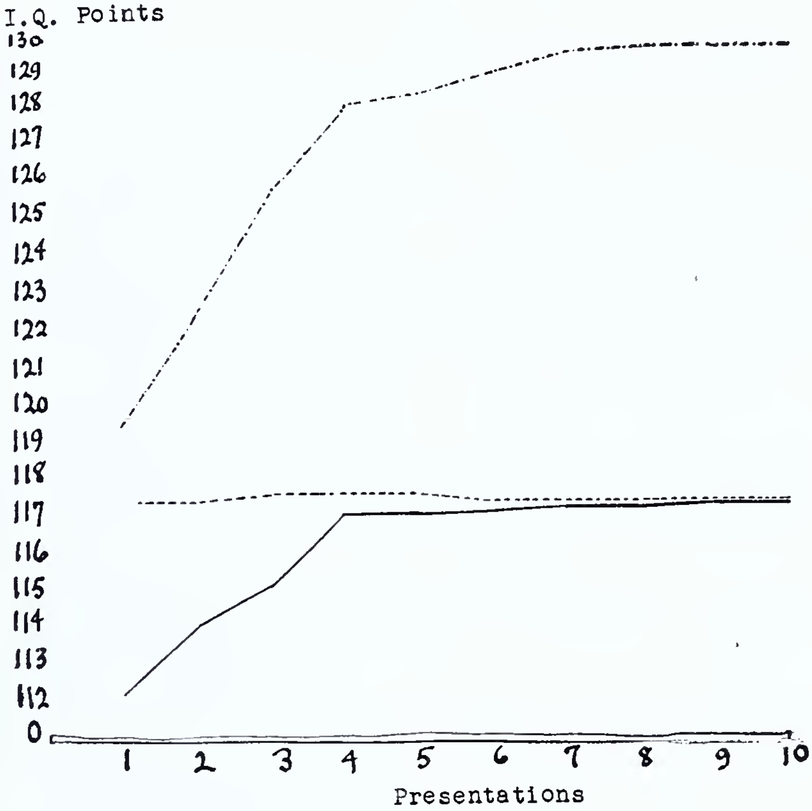

Diagram VI. Average increase in intelligence quotient for the total experimental group as resistance is overcome. (Data from Tables XI, XII, XIII.)
- - - - - Merrill-Palmer Scale
- · - · - Kuhlmann-Binet Scale
——— Merrill-Palmer Scale (not corrected for refusals)

VI

RELATION OF RESISTANCE TO MENTAL AGE AND INTELLIGENCE QUOTIENT

We shall now consider the relation of resistance to mental age and intelligence quotient. The results appearing in a foregoing section do not reveal any significant sex differences between the means of the resistance scores—General Resistance Score, Initial Resistance Score, and Subsequent Resistance Score. Since the number of cases earning resistance scores is not large, the sexes will be combined in correlating resistance scores with mental ages and with intelligence quotients.

These data are unsuitable for the computation of the Pearson *r*, since the distribution is very irregular and spotty in form. The form of the distribution may be seen from the scatter diagrams in Appendix B. The correlations reported in Table XV are used only as rough indications of the agreement between the resistance scores and the mental levels. About all that can be said is that they show a consistent positive relationship between initial and subsequent resistance, though this relationship is far from perfect, and a rather consistent tendency toward a negative relationship between mental level and resistance. Since chronological age is so nearly constant, there is very little difference between the mental age and the intelligence quotient when they are used independently throughout the study.

It is also to be remembered, in considering the results of the study, that the homogeneity of the group as regards chronological age and mental age tends to reduce the relationships and differences obtained statistically.

Resistance and mental level were again investigated as follows: by finding the mean intelligence quotients of the re-

TABLE XV

CORRELATION BETWEEN RESISTANCE SCORES AND INTELLIGENCE RATINGS—KUHLMANN-BINET SCALE, MERRILL-PALMER SCALE, AND THE TWO SCALES COMBINED

	No.	Subs. Resist. Score	M.A.	I.Q.
Kuhlmann-Binet				
Initial Resistance Score	65	+.33 ±.07	−.16 ±.08	−.15 ±.08
Subsequent Resistance Score	51		+.06 ±.08	+.04 ±.08
General Resistance Score ...	71		−.24 ±.08	−.27 ±.07
Merrill-Palmer				
Initial Resistance Score	54	+.14 ±.09	−.31 ±.09	−.30 ±.08
Subsequent Resistance Score	41		−.27 ±.09	−.31 ±.08
General Resistance Score ...	67		−.31 ±.08	−.32 ±.07
Kuhlmann-Binet and Merrill-Palmer Combined				
Initial Resistance Score	74	+.32 ±.07	−.32 ±.09	
Subsequent Resistance Score	68		−.27 ±.09	

sistant children and the non-resistant children and the difference between the means; by finding the mean intelligence quotients of the children above the mean of the general resistance score and below the mean of the general resistance score and the difference between these means. Results of these comparisons may be seen in Table XVI.

The intelligence quotient means of the non-resistant and

TABLE XVI

A COMPARISON OF THE MEAN INTELLIGENCE QUOTIENTS ABOVE AND BELOW THE MEAN IN GENERAL RESISTANCE

	Mean Intelligence Quotient	
	Kuhlmann-Binet	Merrill-Palmer
Children Below the Mean in General Resistance	136.47	122.35
Children Above the Mean in General Resistance	127.66	111.72
Difference	7.81	10.63
P.E. of Difference	2.14	2.04
Difference/P.E.	3.18	5.21

less resistant children are consistently a good deal higher than the intelligence quotient means of the more resistant groups. In addition to this, the group is relatively homogeneous with regard to chronological age and mental age. In view of these facts, the criterion that the difference divided by its probable error must in all instances be at least four in order to insure complete reliability, is probably more severe than is necessary to establish the reliability of the difference.[18] (See Table XVII.)

TABLE XVII

A COMPARISON OF THE MEAN INTELLIGENCE QUOTIENTS OF RESISTANT AND NON-RESISTANT CHILDREN

	MEAN INTELLIGENCE QUOTIENT	
	Kuhlmann-Binet	Merrill-Palmer
Non-Resistant Children	142.50	124.80
Resistant Children	129.80	117.40
Difference between Means	12.70	8.70
P.E. of Difference	2.90	2.84
Difference/P.E.	4.41	3.06

Considering the findings as a whole, there seems to be a tendency for the less resistant group to have the higher average intelligence quotient.

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[18] Garrett, Henry E., *Statistics in Psychology and Education*, p. 136.

VII

RELATION OF RESISTANCE TO THE DIFFICULTY OF THE TEST

RESISTANCE scores for the tests were computed in the same way as for the individual children, as described in the foregoing section, and they will be designated as Test Initial Resistance Score, Test Subsequent Resistance Score, and Test General Resistance Score.

The difficulty of the separate tests of the two scales was determined as follows:

$$\frac{\text{Number of times the test was failed}}{\text{Number of times presented}}$$

In computing the difficulty score, usually the tests falling below the basal level for each child would be counted as passed, and those above the age level in which the child fails every test would be counted as failed. For the purpose of this study, however, the ratio of number of actual failures to number of times presented was used, since we do not know how much resistance would have been manifested if these tests, assumed as passed and failed, had been administered.

The results of the correlation between the resistance score and the difficulty score of the Kuhlmann-Binet tests appear in Table XVIII.

As has been previously stated concerning the distribution of mental ages and resistance scores for the individual children, the distribution of test resistance scores and test difficulty scores is irregular and spotty and furnishes unsuitable data on which to use the Pearson r. The form of the distribution may be seen from the scatter diagram in Appendix C. It is used here only as a rough measure, indicating a nega-

TABLE XVIII

Correlation Between Resistance and Difficulty Scores—Kuhlmann-Binet Scale

	Difficulty Score
Test Initial Resistance Score	− .35 ± .09
Test Subsequent Resistance Score	+ .24 − .10
Test General Resistance Score	+ .34 ± .09

tive relationship between the difficulty of the tests and the percentage of initial resistance and a positive relationship between the difficulty of the test and the percentage of subsequent resistance. When initial and subsequent resistance are combined, the agreement between resistance to the separate test and the difficulty of the separate test is positive.

Difficulty scores were computed for the Merrill-Palmer tests in the same way as for the Kuhlmann-Binet tests, but it was found impossible to derive a resistance score for each difficulty score. This was because most of the tests on the Merrill-Palmer Scale are administered once; at this time the resistance score is obtained, and the tests are scored at various age levels, according to the time required and the errors made in performing the test. We therefore have one resistance score and several difficulty scores for the same test. If the same technique could have been applied to the Merrill-Palmer Scale, it would have been valuable to check the findings thus obtained with the results appearing in Table XVIII.

The relation between resistance and the difficulty of the test was again investigated by finding the ratio of the number of refused tests to the number of tests presented both above and below the mental age of the child on the Kuhlmann-Binet Scale, and by finding the difference between the means of scores thus obtained and the probable error of the difference.

Results presented in Table XIX show that the mean of the resistance scores above the mental ages of the children on the Kuhlmann-Binet Scale is considerably larger than the mean of the resistance scores below the mental ages of the children, though the difference does not exceed four times its probable error.

TABLE XIX

A Comparison of the Mean Resistance Scores Above and Below the Mental Ages of the Children—Kuhlmann-Binet Scale

Mean of Resistance Scores Above M.A.	13.04
Mean of Resistance Scores Below M.A.	8.78
Difference	4.26
P.E. of Difference	1.64
Difference/P.E.	2.59

We may probably conclude from our results as a whole that there is a slight but consistent tendency for the children to refuse more frequently the more difficult tests.

VIII

TESTS MOST FREQUENTLY REFUSED

Tables XX and XXI present the separate tests of the Kuhlmann-Binet and Merrill-Palmer Scales with the following findings for each test: number of initial presentations, number of initial refusals, ratio of initial refusals to times presented; number of subsequent refusals, ratio of subsequent refusals to initial refusals, and number of initially refused tests that were passed, failed, and never attempted.

A brief explanation of certain omissions and the method followed in presenting the tests may be of value in interpreting the results of Tables XX and XXI. If the child refused to repeat the first of three sentences at the third year level, the examiner kept returning to that same sentence until a response was elicited, after which the child usually attempted the second or third sentence following one presentation. This same method was followed with Repetition of Sentences at the fifth year level and with the Repetition of Numerals. It was usually easier to elicit a response to the presentation of three numerals and five numerals after the two numerals had been attempted. This accounts, for example, for the fact that subsequent presentations of three and five numerals were less frequent than subsequent presentations of two numerals; the same may be said of Buttons 1, as compared with Buttons 3 and 4 on the Merrill-Palmer Scale. The second presentation of the Seguin Board elicited more frequent resistance than the first, and this resistance to the second presentation almost invariably followed great difficulty in placing the blocks the first time.

The telegraph snapper used by Goodenough was substituted for the sugar in Test No. 5, second year level, Kuhlmann-Binet Scale. In presenting the Description of Objects

TABLE XX

Kuhlmann-Binet Tests in Order of Subsequent Refusals

Item	A	B	C	D	E	F		
	Number of Initial Presentations	Number of Initial Refusals	Ratio B/A	Number of Subsequent Refusals	Ratio D/B	Final Outcome of B		
						Pass	Fail	Not Attained
Repeating 2 numbers	100	29	29	66	2.3	28	0	1
Three-Year Repeating Sentences	100	30	30	66	2.2	30	0	0
Five-Year Repeating Sentences	100	34	34	64	1.9	17	15	2
Comprehension	100	22	22	57	2.6	18	4	0
Family Name	100	17	17	45	2.7	13	2	2
Definitions	100	24	24	36	1.5	9	14	1
Discrimination of Forms	100	8	8	28	3.5	3	3	2
Three-Year Memory Pictures	100	13	13	28	2.1	5	6	2
Imitating Movements	75	21	28	28	1.3	21	0	0
Comparing 2 Objects	78	7	9	19	2.7	0	6	1
Tracing Square	100	6	6	18	3.0	1	5	0
Enumerating Objects	100	12	12	18	1.5	12	0	0
Repeating 3 Numerals	100	13	13	18	1.4	13	0	0
Morning and Afternoon	87	11	13	15	1.1	5	6	0
Right and Left Hand	87	8	9	13	1.6	2	5	1
Recognition of Forms	100	3	3	13	4.3	0	1	2
Five-Year Tap Blocks	100	16	16	12	.75	4	11	1
Repeating 5 Numerals	78	7	9	11	1.7	1	4	2
Repeating Numbers Backward	78	3	4	11	3.7	0	0	3
Parts of Body	100	11	11	9	.8	11	0	0
Folding Paper	87	6	7	8	1.3	0	5	1
Tracing Irregular	100	2	2	8	.4	1	1	0
Word Opposites	78	4	5	7	1.7	0	3	1
Naming Colors	100	5	5	7	1.4	0	5	0
Giving Sex	100	8	8	6	.75	4	4	0
Counting 4 Pennies	100	2	2	5	2.5	0	1	1
Three Commands	87	3	5	5	1.6	1	1	1
Naming Familiar Objects	100	1	1	4	4.0	1	0	0
Comparing Weights	100	6	6	4	.67	1	5	0
Four-Year Memory Pictures	100	5	5	4	.8	0	4	1
Rectangle from 2 Triangles	100	4	4	3	.75	1	3	0
Six-Year Count Taps	87	3	3	1	.33	0	2	1
Six-Year Tap Blocks	87	4	5	1	.5	0	3	1
Copying Square	100	1	1	1	1.0	0	1	0
Two-Year Objects Picture	75	2	3	0	0	2	0	0
Two-Year Copy Circle	75	2	3	0	0	2	0	0
Mutilated Picture	87	1	1	0	0	0	1	0
Two-Year Commands	75	0	0	0	0	0	0	0
Removing Wrapping	75	0	0	0	0	0	0	0
Comparing 2 Lines	100	0	0	0	0	0	0	0
Aesthetic Comparison	100	0	0	0	0	0	0	0
Naming Coins	78	0	0	0	0	0	0	0
Number of Fingers	78	0	0	0	0	0	0	0
Total		354		639		206	121	27

TABLE XXI

Merrill-Palmer Tests in Order of Subsequent Refusals

Item	A	B	C	D	E	F		
	Number of Initial Presentations	Number of Initial Refusals	Ratio B/A	Number of Subsequent Refusals	Ratio D/B	Final Outcome of B		
						Pass	Fail	Not Attained
Repeating Word Groups	86	22	25.6	57	2.6	21	0	1
Buttons	100	23	23	41	1.8	19	4	0
Seguin Board, 2*	100	15	15	31	1.2	10	5	0
Fist and Thumb	86	19	22	27	2.1	13	6	0
Questions	46	10	21.7	24	2.4	10	0	0
Repeating Words	46	5	10.9	23	4.6	5	0	0
Action Agent	100	8	8	23	2.8	8	0	0
Counting Two Blocks	86	17	19.8	20	1.2	13	4	0
Thumb and Finger	100	10	10	16	1.6	4	6	0
Seguin Board, 3*	100	9	9	10	1.1	9	0	0
Pink Tower	100	4	4	8	2.0	2	2	0
Three-Cube Pyramid	100	10	10	8	.8	8	2	0
Four Buttons	100	8	8	7	.9	3	5	0
Copy Circle	100	9	9	7	.8	8	1	0
Seguin Board, 1*	100	6	6	6	1.0	0	6	0
Identifying Self in Mirror	46	1	2.1	5	5.0	1	0	0
Matching Colors	86	2	2.3	4	2.0	2	0	0
Nest of Cubes	86	4	5	4	1.0	3	1	0
Two Buttons	100	5	5	4	.8	5	0	0
Mare and Foal	100	6	6	4	.67	4	2	0
Picture Puzzle I	100	3	3	3	1.0	1	2	0
Decroly Matching	91	2	2	3	1.3	2	0	0
Six-Cube Pyramid	100	6	6	3	.5	1	5	0
Sixteen Cubes	86	3	3.5	2	1.9	3	0	0
Wallin Peg A, 2*	100	4	4	2	.5	4	0	0
Wallin Peg B, 2*	100	5	5	2	.4	5	0	0
Straight Tower	7	1	14	1	1.0	1	0	0
Walking Blocks	7	1	14	1	1.0	1	0	0
Crossing Feet	7	1	14	1	1.0	1	0	0
Drawing String	46	1	2	1	1.0	1	0	0
Cut with Scissors	46	1	2	1	1.0	1	0	0
Wallin Peg B, 1*	100	2	2	1	.5	2	0	0
Picture Puzzle 2	100	2	2	1	.5	2	0	0
Wallin Peg A, 1*	100	5	5	1	.2	5	0	0
Standing on One Foot	7	1	14	0	0	1	0	0
Wallin Peg A, 3*	100	2	2	0	0	2	0	0
Wallin Peg B, 3*	100	2	2	0	0	2	0	0
Picture Puzzle 3	100	0	0	0	0	0	0	0
Commands	7	0	0	0	0	0	0	0
Throwing Ball	7	0	0	0	0	0	0	0
Folding Paper	7	0	0	0	0	0	0	0
Copying Cross	100	0	0	0	0	0	0	0
Copying Star	75	0	0	0	0	0	0	0
Manikin	100	0	0	0	0	0	0	0
Total		235		352		183	51	1

* Resistance was recorded separately for each of the three repetitions of Seguin Board and Wallin Peg Boards A and B.

in Pictures at the third year level, the seventh year directions were used first in presenting the test in order to elicit description rather than enumeration of objects in the picture, if the child was capable of doing so. Resistance was recorded for the third year level only, since the test was presented but once, though if the child succeeded in reaching the seventh year level, the test was scored again as passed or failed. Since Drawing the Square was never passed by any of the three-year-olds, the Diamond was not presented; therefore no resistance was recorded for drawing the diamond.

The Kuhlmann tests most frequently refused were: Repetition of Numbers, Repeating Sentences, Comprehension, Family Name, Definitions, Discrimination of Forms, and Imitation of Movements. The tests never refused were: Two-year Commands, Removing Wrapping from Snapper, Comparison of Two Lines, Aesthetic Comparison, Naming Coins, and Number of Fingers. These results are presented in Table XX.

The Merrill-Palmer tests most frequently refused were: Repetition of Word Groups, Button, Seguin Board, Fist and Thumb, Questions, Repetition of Words, Action Agent, Counting Two Blocks, Thumb and Finger; whereas Picture Puzzles, Commands, Throwing Ball, Folding Paper, Copying Cross, Copying Star, and Manikin were never refused, as may be seen from Table XXI.

IX

SUMMARY (SECTIONS IV, V, VI, VII)

Of the one hundred children studied, twenty-five accepted every test of the Kuhlmann-Binet Scale on initial presentation; at the end of the experiment four children remained resistant. Thirty-two children accepted every test of the Merrill-Palmer Scale when it was first presented; at the end of the experiment one child only remained resistant.

Considering the two scales together, sixteen children accepted every test of both scales when they were first presented, and four children remained resistant at the end of the experiment.

Fifty-eight per cent of the Kuhlmann tests initially refused were passed; seventy-eight per cent of the Merrill-Palmer tests, initially refused, were passed.

Twenty-five of the ninety-six children finally accepting every test showed fifteen to thirty-five points of increase in intelligence quotient from first to final presentation of the Kuhlmann-Binet tests; five children on the Merrill-Palmer Scale, not corrected for refusals, showed a similar increase in intelligence quotient points. When the device which corrects for refusals was applied, not a child of the group studied showed an increase of as much as fifteen intelligence quotient points from first to final presentation of the Merrill-Palmer Scale.

The mean intelligence quotient of the non-resistant children considerably exceeds the mean intelligence quotient of the resistant children on both scales. On the Kuhlmann-Binet Scale the difference exceeds four times its probable error.

The mean of the intelligence quotients of those children having scores below the mean of the general resistance score is considerably larger than the mean of the intelligence quotients of those children having scores above the mean of the general resistance score on both scales. The difference between Merrill-Palmer intelligence quotients means exceeds four times its probable error.

Results show a negative relationship existing between initial refusals and difficulty of the test and a positive relationship between subsequent refusals and difficulty of the test. When initial refusals and subsequent refusals are combined, the correlation is positive.

The mean of the resistance score on tests above the mental age of the child exceeds the mean of the resistance score on tests below his mental age, though it is not certain that the difference is significant.

Marked differences in the percentages of initial and subsequent refusals were found for individual tests of both scales.

The group studied was consistently less resistant to the Merrill-Palmer tests than to the tests of the Kuhlmann-Binet Scale, as measured by total number of initial and subsequent refusals of the separate tests, resistance scores for the separate tests, resistance scores for the individual children, and number of children initially refusing and finally accepting every test.

Initial resistance and subsequent resistance are not the same and should not be treated in the same way. The coefficient of correlation between the two (Kuhlmann-Binet Scale) was found to be only .33 ± .07.

The results obtained clearly show the advantage of the device used by Stutsman in correcting for refusals. Thirty children show gains or losses from two to fifteen points in intelligence quotients from first to final presentation when the device is used; forty-two children show gains of two to twenty-four points in intelligence quotients when the device is not used. Average intelligence quotient change for the resistant group from first to final presentation is five and one-tenth points when the device is not used. When the device is used, the average intelligence quotient remains the same from first to final presentation.

X

RESPONSES MADE BY THE CHILDREN WHEN NOT ATTEMPTING THE TESTS

THE responses made by the eighty-six resistant children when not attempting the tests of the Merrill-Palmer and Kuhlmann-Binet Scales combined appear in Appendix A. The numbers opposite the various types of responses represent the total number of times the response occurred, but they should not be taken to mean the number of times the tests were refused, since a verbal response might express more than one idea and would therefore fall under more than one heading or, for example, if a child said, "No, no," when refusing one test, this response would be counted twice.

It is interesting to observe that silence was the most frequent type of refusal and that direct verbal noncompliance came next in order; escape from the situation was the next most frequent, and despite the fact that the requests by the examiner were repeated many times, destructive behavior occurred only five times. The other responses seem to indicate roughly that there was a conflicting interest, that the child was attracted by something else, or that he had an idea of his own which he wished to express either in use of the materials or verbally. This might also be interpreted as conscious evasion.

From the analysis of results appearing in Table XXII, it will be observed that of the three responses made by the children when not attempting the tests, silence was the most frequent and showed the highest percentage of refusals passed when finally attempted, although it also showed the largest number of refusals never attempted. Of the twenty-seven Kuhlmann-Binet tests never attempted, silence was the manner of refusal for twenty-two and "I don't know," for two. "I

TABLE XXII

NUMBER OF RESPONSES: SILENCE, I DON'T KNOW, I CAN'T, MADE BY CHILDREN WHEN NOT ATTEMPTING TESTS

	KUHLMANN-BINET			MERRILL-PALMER		
	Boys	Girls	Total	Boys	Girls	Total
Silence						
Initial	84	82	166	36	44	80
Subsequent	150	109	259	99	56	155
Passed	51	59	110	32	35	67
Failed	19	17	36	4	7	11
Never Attempted	14	6	20	0	2	2
Per Cent of Initial Refusals Passed	61	72	66	39	80	84
I Can't						
Initial	20	14	34	14	15	29
Subsequent	7	3	10	7	8	15
Passed	7	7	14	7	10	17
Failed	13	7	20	7	5	12
Never Attempted	0	0	0	0	0	0
Per Cent of Initial Refusals Passed	35	50	41	50	66.7	59
I Don't Know						
Initial	41	66	107	174	159	333
Subsequent	7	15	22	43	148	191
Passed	6	21	27	28	31	59
Failed	35	45	80	146	126	272
Never Attempted	0	0	0	0	1	1
Per Cent of Initial Refusals Passed	15	32	25.3	16	19	18

can't" showed the next highest percentage of refusals passed and "I don't know," the lowest percentage of refusals that were finally passed.

XI

COMPARISON OF RESULTS WITH THOSE OF OTHER INVESTIGATORS

Goodenough defines three traits—shyness, negativism, and distractibility—in terms of overt behavior manifested, and rates the individual children on a scale of one to three for each trait. For shyness, a rating of one was given to "Children who came to the examining room readily without the mother, or who were willing to have the mother leave the room within a moment or two, and who appeared entirely at ease throughout the tests." For negativism, a rating of one was given to "Children who responded promptly throughout the examination, and were willing at least to attempt whatever they were asked to do."

On the first test Goodenough reports that sixty-five per cent of the two-year-olds, seventy-five per cent of the three-year-olds, and eighty-two per cent of the four-year-olds received a rating of one on shyness. When these children were given the same test six weeks later, the rating on shyness decreased and age differences as to the amount of shyness manifested practically disappeared. Fewer than five per cent were given a rating of three at any time. The percentages of children receiving a rating of three are not reported for the other behavior traits nor is the number of children receiving a rating of two reported for any of the traits.

For negativism, Goodenough reports that age differences are in the same direction and are about equal in amount to those recorded for shyness. These differences did not disappear, however, when the test was repeated six weeks later, and they showed little improvement at any time.

For distractibility the younger children are rated as more distractible than the older children, though the percentages falling into the categories one, two, and three are not given.[19]

Goodenough described her method of evaluating the interest value of the separate tests as follows:

> In order to obtain some roughly quantitative data on the relative attractiveness of the separate tests for children at these early ages, the examiners made a practice of indicating, by means of a special symbol, those tests which the child seemed particularly to enjoy, while tests in which interest could be aroused only with considerable difficulty or which seemed to provoke antagonism were marked with a different symbol. . . . Children were not questioned as to their preferences, the judgment was made purely upon the basis of their spontaneous behavior."[20]

In Table XXIII are listed the tests indicating interest value as designated by Goodenough. Opposite each test is the number of initial refusals and the ratio of initial refusals to initial presentations by the children of the present study. Zero indicates that the test has never been refused.

From Table XXIII it can be seen that both Goodenough's results and those of the present study show that of the Kuhlmann-Binet tests, Imitation of Movements, Repeating Numerals and Sentences, and Family Name are frequently refused; whereas Copying Circle, Naming Familiar Objects, and Comparison of Lines are infrequently refused.

In a previous section it has been stated that the number of times a child may be urged and the directions repeated by the examiner vary with the separate tests of the scale. It is to be remembered that for this experiment, in order to measure equally the amount of resistance evidenced for each separate test, the examiner never urged the child and gave the command once only. If the child did not attempt the test within thirty seconds, his response was recorded as a refusal. This same plan was followed with subsequent refusals until the test was accepted or until the time allowed for the experiment had elapsed. It is assumed that Stutsman counted as refusals only

[19] Goodenough, *op. cit.*, pp. 105-108.

[20] Goodenough, *op. cit.*, pp. 74-75.

TABLE XXIII

Interest Value of Separate Tests Designated by Goodenough Compared with Number and Percentage of Refusals by the Children of the Present Study—Kuhlmann-Binet Scale

Type of Test	Initial Refusals	
	Number of Initial Refusals	Per Cent IR*/IP
Kuhlmann-Binet		
Two-Year Series		
Liked More Frequently Than Disliked, in Order Named:		
Copying circle	2	2.7
Commands	0	
Removing wrapper from snapper	0	
Pointing to objects in picture	2	2.7
Disliked Four Times as Frequently as Liked:		
Imitation of movements	21	28
Three-Year Series		
Most Frequently Liked:		
Tracing square	6	6
Memory for pictures	13	13
Enumeration of objects in pictures	12	12
Naming familiar objects	1	1
Parts of body	11	11
Most Disliked:		
Repeating two numerals	29	29
Repeating sentences	30	30
Family name	17	17
Four-Year Series		
Most Liked Tests:		
Discrimination of forms	8	8
Memory of pictures	5	5
Tracing irregular	2	2
Recognition of form	3	3
Comparison of two lines	1	1
Most Frequently Disliked:		
Repeating three numerals	12	13
Neutral:		
Giving sex	8	8
Comprehension	22	22
Five-Year Series		
Most Often Disliked:		
Repeating sentences	34	34
Most Liked of the Series:		
Naming colors	5	5
Bi-modal: Tapping blocks	16	16

* IR = Initial Refusals; IP = Initial Presentations.

TABLE XXIII—(*Continued*)

Type of Test	Initial Refusals	
	Number of Initial Refusals	Per Cent IR* / IP
Rather Neutral Interest:		
Counting four pennies	2	2
Copying square	1	1
Comparison of weights	6	6
Rectangle from two triangles	4	4
Definitions	24	24
Six-Year Series		
Order of Interest Value:		
Three commands	3	3
Mutilated pictures	1	15
Aesthetic comparisons	0	
Folding paper	6	7
Bi-modal Distribution of Interest:		
Tapping blocks	4	5
Neutral Interest:		
Right and left	8	9
Morning and afternoon	11	13
Counting taps	3	3.4
Seven-Year Series		
Most Frequently Liked:†		
Description of pictures (given only at Three-Year Level)		
Most Frequently Disliked:		
Repeating numerals	7	9
Neutral Interest Value:		
Naming coins	0	
Number of fingers	0	
Comparison of two objects from memory	7	9
Numbers backwards	3	4
Copying diamond‡	0	
Word opposites	3	4

* IR = Initial Refusals; IP = Initial Presentations.

† In the present study presented at the third year level only; therefore no resistance was recorded for this test at the seventh year level.

‡ Never presented in this study.

the tests that remained unattempted after the directions for urging and for repeating the test had been carried out. Following the method devised by Levy and Tulchin, Stutsman analyzed the proportion of refusals by age. Results for those most nearly comparable in age range with the children of the present study are reported in Table XXIV.[21]

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[21] Stutsman, Rachel, *op. cit.*, Table 21, p. 132.

TABLE XXIV

Number and Per Cent of Complete and Partial Refusals Obtained by Stutsman

	Age Group (Months)	
	30–35	36–41
Complete Refusal, Number	0	1
Complete Refusal, Per Cent	0	1.3
Partial Refusals, Number	22	3
Partial Refusals, Per Cent	24.4	3.8
No Refusal, Number	68	74
No Refusal, Per Cent	75.6	94.9

A comparison of Stutsman's results as to percentage of refusals of the separate tests with those of the present study is given in Table XXV. Though the number of children is about the same for the two groups compared, it will be observed that the age range is different.[22]

Stutsman's results and those of the present study agree in showing that Counting Blocks, Fist and Thumb, Words and Word Groups, Thumb and Finger, and Action Agent were among the tests most frequently refused by the children of both groups, whereas Manikin, Copying Star, and Cross were seldom refused by Stutsman's group and never refused by the children of the present study.

Nelson investigated resistance as one of six aspects of the child's behavior in the mental test situation.[23] The ninety-one children studied were obtained from White Plains, New York. The age range was thirty-three to thirty-nine months; intelligence quotient range on the Merrill-Palmer Scale, 59 to 144; Mean, 107.6; S.D., 16.5. Intelligence quotient range on the Kuhlmann-Binet Scale was 65 to 138; Mean, 101.9; S.D., 14.8.

The tests were administered during two test periods, but

[22] Stutsman, Rachel, *op. cit.*, Table 20, p. 131.

[23] Nelson, *op. cit.*

TABLE XXV

Number and Per Cent of Refusals of Each Test Obtained by Stutsman Compared with the Results of the Present Study

Test	Stutsman				Present Study	
	30–35 Months		36–41 Months		34½–37½ Months	
	Number	Per Cent	Number	Per Cent	Number	Per Cent IR*/IP
Crossing Feet					1	14
Standing on One Foot					1	14
Walking Block					1	14
Folding Paper	4	7			0	0
Counting Two Blocks	5	10			17	19.8
Questions	3	5			10	21.7
Fist and Thumb	8	15	2	6	13	22
Words	5	8			5	10.9
Word Groups	9	15			22	25.6
Drawing Up String	5	8			1	2
Straight Tower	3	6			1	14
Cutting with Scissors	4	6			1	2
Commands	4	8			0	0
Copying Circle	4	5	1	1	9	9
Peg Board B, 1†	1	2	0	0	2	2
Peg Board 2					4	4
Peg Board 3					2	2
Throwing Ball	3	5			0	0
Picture Puzzle No. 2	2	9	1	3	2	2
Picture Puzzle No. 3	2	8	1	3	0	0
Two Buttons	5	6	1	1	5	5
Four Buttons	1	5	1	2	8	8
Sixteen Cubes	3	4			3	3.5
Identification in Mirror	3	6			1	2.1
One Button	4	7			23	23
Peg Board A, 1†	0	0	0	0	5	5
Peg Board 2					4	4
Peg Board 3					2	2
Nest of Cubes	2	3			4	5
Three-Cube Pyramid	2	3	1	1	10	10
Matching Colors	2	3			2	2.3
Thumb and Fingers	1	7	3	5	10	10
Manikin			2	6	0	0
Picture Puzzle No. 1	4	5	1	1	3	3
Mare and Foal	1	4	1	1	6	6
Six-Cube Pyramid	1	5	1	2	6	6
Action Agent	3	4	3	4	8	8
Little Pink Tower	2	3	1	1	4	4
Seguin Form Board, 1†	2	2	1	1	6	6
Seguin Form Board, 2					25	25
Seguin Form Board, 3					9	9
Decroly Matching	0	0	1	3	2	2
Copying Star	0	0	1	2	0	0
Copying Cross	0	0	1	2	0	0

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* IR=Initial Refusal; IP=Initial Presentation.

† For the purpose of this study, resistance was recorded separately for each of the three repetitions of Peg Boards A and B and Seguin Form Board.

we do not know the time intervening between the periods or the order followed in presenting the two scales. The examiner returned to a given test four times, and resistance was measured for an individual child by the number of tests resisted plus the number of times each test was presented again and resisted, regardless of the total number of tests presented. The range of the resistance scores thus obtained was from 0 to 29, with Mean, 7.2 and S.D., 7.98.

With the intelligence quotient range extending as low as 65, it is probable that all the children studied by Nelson did not base at the two-year level. For those that did not, the criterion for resistance is less objective, since the tests of the eighteen-month level are of the more or less observational type and the mother's or nurse's word is taken as to whether the child does or does not pass the test.

We do not know whether repetition of refused tests by the examiner was limited to one test period or whether refused tests during the first period were carried over to the second test period. The tests were administered in the investigator's home, and all mothers were present during the examination. It is not certain whether Nelson counted as resisted a test not attempted after the amount of repetition and urging allowed for in the directions had been given, or whether she followed the method used in this study. Certain instances of "I can't" or "I don't know" were not counted as resistance.

Nelson reports the following results: of the 391 Kuhlmann-Binet tests which were resisted, all but forty-two, or approximately ninety per cent, were finally accepted. The results of the present study show that of the 354 tests refused, all but twenty-seven, or ninety-two and four-tenths per cent of the tests initially refused, were finally accepted.

From the results appearing in Table XXVI, it may be seen that both Nelson's study and the present investigation agree in showing a tendency for children above the mean of the general resistance score to have lower intelligence quotients than children below the mean of the general resistance score.

TABLE XXVI

Mean Intelligence Quotient of Group Falling Above and Below Mean Score of Resistance Obtained by Nelson Compared with the Results of the Present Study

Test	Mean I.Q.		Difference in Mean I.Q.	P.E. of Difference	Difference / P.E.
	Group with High General Resistance Score	Group with Low General Resistance Score			
Nelson's Study:					
Kuhlmann-Binet	100.3	111.0	10.7	2.6	4.1
Merrill-Palmer	99.1	103.2	4.1	2.4	1.71
Present Study:					
Kuhlmann-Binet	127.66	135.47	7.81	2.14	3.18
Merrill-Palmer	111.72	122.35	10.63	2.04	5.20

TABLE XXVII

Correlation Between Resistance and Mental Age and Between Resistance and Intelligence Quotient, Kuhlmann-Binet Scale, Obtained by Nelson Compared with the Results of the Present Study

	r
Nelson's Study	
M.A. and Resistance	− .32 ± .05
I.Q. and Resistance	− .29 ± .06
Present Study	
M.A. and General Resistance Score	− .24 ± .08
I.Q. and General Resistance Score	− .27 ± .07

Results in Table XXVII show that the two studies agree in finding a negative relationship between mental age and resistance, and between intelligence quotient and resistance.

Nelson reports a definite tendency for children to resist the more difficult tests—those appearing above their mental age on the scale. Results of the present study show that the amount of resistance manifested by the individual children on tests above their mental age on the scale is greater than the amount of resistance manifested on tests below their mental age. However, the difference between the two means above and below the mental age does not exceed four times its probable error, as may be seen from Table XXVI.

Nelson reports that twenty per cent of the ninety-one children remained resistant to one or more Kuhlmann tests. Ten per cent remained resistant to one test only. Ten per cent remained resistant to from two to six tests.

Results of the present investigation show that four per cent of the hundred children remained resistant at the end of the experiment. The number of tests finally resisted ranges from three to nine for the four children who refused to accept all tests.

Though the set of the problem, the method followed, and the mental level of the two groups of children in the two experiments were quite different, it is interesting to observe the extent to which the results of the two studies agree in the few instances where the data obtained have been treated in somewhat the same way.

XII

SEX DIFFERENCES

Initial and subsequent refusals of the separate tests of the two scales and responses made by the children when they were not attempting the tests were tabulated separately for boys and girls. A comparison of results showed that there were no consistent and significant sex differences. These results were therefore combined for the sexes in the tables which appear in this study. Table XXVIII shows that among the children earning resistance scores, there is a tendency for the girls to earn more resistance scores than the boys, but the number of girls and boys earning resistance scores is small and the difference found to exist could easily be attributed to chance rather than to a real sex difference. The difference between the mean mental ages and intelligence quotients for boys and girls on the Merrill-Palmer Scales was not found to be significant, as is shown in Table XXIX. The difference between the means of the resistance scores for boys and girls was not found to be significant, as may be seen from Table IX. When we compare, with respect to sex differences, those children who accepted every test of the combined scales on initial presentation and those children who remained resistant at the end of the second, third, and final test periods, the differences between the sexes are too small to be considered significant.

Reynolds' results show no significant difference between the means of the resistance scores for boys and girls, but the numbers of girls and of boys are not equal and Reynolds concludes that a comparison of sex differences is probably not justified.

Stutsman does not attempt to compare for sex differences the total group on which she standardized her scale. She concludes that her numbers at successive age levels, approximately

TABLE XXVIII

Number of Boys and Girls Obtaining Resistance Scores

		Boys	Girls	Total
Initial Resistance Score (KB)	Tests common to all	28	37	65
Subsequent Resistance Score (KB)	Tests common to all	23	28	51
Initial Resistance Score (MP)	Tests common to all	26	28	54
Subsequent Resistance Score (MP)	Tests common to all	21	20	41
General Resistance Score (KB)		33	38	71
General Resistance Score (MP)		33	34	67

TABLE XXIX

Comparison of the Mean Mental Age and Mean Intelligence Quotient for Boys and for Girls—Merrill-Palmer Scale

	M.A.	I.Q.
Mean for Boys	42.40	116.10
Mean for Girls	44.10	122.00
Difference in Means	1.70	5.90
P.E. of Difference	.81	2.16
Difference/P.E.	2.10	2.70

fifty, are not large enough at each six-month interval, to warrant the comparison of sexes.

Goodenough found no sex difference as measured by her rating scale for shyness. For negativism her results are reported as follows:

> The mean rating for the boys is higher (indicating greater tendency to negativism) than is that for the girls at every age on the first test, and at ages three and four on the second test. When the data are subjected to further analysis, however, the gross sex difference is found to be secondary to a social difference, which operates unequally for the two sexes. Among the boys, the greatest amount of negativism is found in the upper occupational classes. This is clearly true for ages two and three on both tests; at age four the differences are less apparent because of the relatively infrequent appearance of this form of behavior at that age.[24]

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[24] Goodenough, *op. cit.*, pp. 107-108.

Goodenough found no consistent difference between the social classes for the girls in respect to negativism.

In comparing her results with those obtained by Levy and Tulchin, in which the girls are said to be more resistant than the boys at every age except the thirtieth month, Goodenough makes the point that the cases used in the Levy and Tulchin study were obtained almost entirely from the lower occupational classes, the class from which the least resistant children of her study came. The subjects of the present study came exclusively from the upper occupational classes, and resistance, as here defined, could not be interpreted by any measure used throughout the study as indicating a greater tendency for the boys to be more resistant than the girls. Goodenough reports the boys as being more distractible than the girls.

SUMMARY

Sex differences, as measured by differences between means of the various measures used throughout this study, were consistently not found to be significant.

As measured by the resistance scores for the individual children, the girls show a slight but consistent tendency to have a larger number of resistance scores than the boys. This difference is so small that it could easily be attributed to chance.

Nelson reports differences between the sexes to be negligible with respect to resistance.

Goodenough reports that the mean rating for negativism was higher for the boys than for the girls at every age. On further analysis of the data, Goodenough found that no consistent difference in negativism existed between the girls of one social class as compared with another, whereas among the boys, the greater amount of negativism was found among the upper social classes. In the present study, the subjects were almost exclusively from the upper social classes. The results do not substantiate Goodenough's findings in this respect.

XIII

COMPARISON OF THE KUHLMANN-BINET AND MERRILL-PALMER SCALES

Despite the fact that the number of tests within the range covered by the group of children studied was approximately the same for the Kuhlmann-Binet and the Merrill-Palmer Scales, as may be seen in Tables XX and XXI, it will be observed that the Kuhlmann-Binet tests were much more frequently refused than were the tests of the Merrill-Palmer Scale. There were 235 initial refusals of Merrill-Palmer tests as compared with 354 initial refusals of Kuhlmann-Binet tests. Expressed in percentages, the total number of Merrill-Palmer tests initially refused was sixty-six per cent of the total number of Kuhlmann-Binet tests initially refused. There were 638 subsequent refusals of Kuhlmann-Binet tests, whereas the total number of subsequent refusals of the Merrill-Palmer tests was 350, or fifty-five per cent of the subsequent refusals of the Kuhlmann-Binet tests.

Sixty-five initial and fifty-one subsequent resistance scores were derived from the Kuhlmann-Binet Scale, as compared with fifty-five initial and forty-one subsequent resistance scores derived for the Merrill-Palmer Scale. Thirty-two children attempted every Merrill-Palmer test on initial presentation; twenty-five children attempted every Kuhlmann-Binet test on initial presentation. At the end of the experiment, one child had failed to attempt one Merrill-Palmer test, and four children had failed to attempt from three to nine Kuhlmann-Binet tests.

We may conclude from the results obtained that the Merrill-Palmer tests are more acceptable to the group of children studied than are the tests of the Kuhlmann-Binet Scale. The difference between the numbers of initial and subsequent refusals of the separate tests of the two scales is not large enough to justify a detailed analysis. In general, the difference may be explained by the preference for such materials as blocks, pegs, and picture puzzles, which the child is interested in manipulating and which are included in the Merrill-Palmer material but are not included in the Kuhlmann-Binet material. Pencil and paper tests are rather high in interest value on both scales. Tests which involve a verbal response only—particularly mere repetition of numerals and sentences—are frequently refused.

It is to be observed that the difference between the means of the same group of children on the Kuhlmann-Binet and Merrill-Palmer tests is significant.

Although less resistant to the Merrill-Palmer Scale, the present group of subjects made much lower intelligence quotients on it than on the Kuhlmann-Binet. This is probably due in part to the fact that the Merrill-Palmer Scale was standardized almost entirely on *volunteered children.* Volunteered children are very highly selected toward the superior side of the average in the present study; and undoubtedly this would always be true of volunteers.[25]

Goodenough's findings also show that the sources yielding the highest intelligence quotients of her total group were the volunteered children and those obtained by home visit and invitation.[26]

Table XXX gives a comparison of the results obtained by the use of the Merrill-Palmer Scale with those obtained by the use of the Kuhlmann-Binet Scale.

The coefficients obtained in correlating the Merrill-Palmer and Kuhlmann-Binet mental ages and the Merrill-Palmer and Kuhlmann-Binet intelligence quotients of the group studied

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[25] Stutsman, Rachel, *Performance Tests for Children of Pre-School Age.* Genetic Psychology Monographs, Vol. I, No. 1. Clark University Press, pp. 5, 6.
Stutsman, Rachel, *The Mental Measurement of Preschool Children,* pp. 70-73.

[26] Goodenough, *op. cit.*, Table 13, p. 47.

TABLE XXX

COMPARISON OF THE MEAN MENTAL AGES AND THE MEAN INTELLIGENCE QUOTIENTS OBTAINED ON THE KUHLMANN-BINET AND MERRILL-PALMER SCALES

	KUHLMANN-BINET	MERRILL-PALMER	
Mean M.A.	48.00	43.24	
Difference			4.96
P.E. of Difference			.96
Difference/P.E.			5.17
Mean I.Q.	132.69	119.05	
Difference			14.00
P.E. of Difference			1.48
Difference/P.E.			9.45

appear in Table XXXI. In observing the differences between Stutsman's results and those of the present study, it is to be remembered that the relative homogeneity of this group in respect to chronological age and mental age would reduce the size of the coefficient obtained.[27]

TABLE XXXI

CORRELATION BETWEEN MERRILL-PALMER AND KUHLMANN-BINET SCALES AND BETWEEN MERRIL-PALMER AND STANFORD-BINET SCALES

PRODUCT-MOMENT FORMULA

	r	NUMBER OF CASES
Mental Age		
Merrill-Palmer and Kuhlmann-Binet	.63 ± .04	100
Intelligence Quotient		
Merrill-Palmer and Kuhlmann-Binet	.60 ± .04	100
Merrill-Palmer and Stanford-Binet (Stutsman)		
Standardization Group	.793 ± .192	159
Polka State School	.794 ± .049	29
Merrill-Palmer (Nursery School)	.783 ± .025	115

In addition to this, Goodenough's results show that the Kuhlmann-Binet Scale tends to rate young children somewhat too high. The mean of the intelligence quotient of her unselected group of three-year-olds was 104.4 on the first test and 107.6 when the test was repeated. This result would lead us to expect a slightly greater discrepancy between the Kuhlmann-Binet and the Merrill-Palmer test ratings than is found between the Stanford-Binet and Merrill-Palmer test ratings.[28]

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[27] Stutsman, Rachel, *The Mental Measurement of Preschool Children,* p. 116.

The results given in Table XXXII may also throw some light on the differences which appear above. It is to be observed that the discrepancy between the ratings of the two scales increases markedly above an intelligence quotient of 120. It would therefore be expected that the correlation between the two tests would be lower when the subjects tested are very superior.

TABLE XXXII

COMPARISON OF INTELLIGENCE QUOTIENTS OBTAINED ON THE KUHLMANN-BINET AND MERRILL-PALMER SCALES (KUHLMANN-BINET MINUS MERRILL-PALMER)

KUHLMANN I.Q.	NUMBER	DIFFERENCE IN I.Q. POINTS	AVERAGE DIFFERENCE
140–175	27	608	12.5
131–140	33	452	13.7
121–130	14	219	15.6
100–120	26	135	5.2

An additional factor may be considered. Though the number of tests necessary for adequate measurement of the children of the present study was approximately the same for the two scales, appreciably more Kuhlmann-Binet tests than Merrill-Palmer tests were refused. Ninety-six per cent of the children finally accepted every test of the Kuhlmann-Binet Scale and fifty-eight per cent of these refused tests were finally passed. The mean Kuhlmann-Binet mental age and intelligence quotient may therefore be higher than the corresponding mean mental age and intelligence quotient of the Merrill-

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[28] Goodenough, *op. cit.*, p. 42.

Palmer Scale as a result of overcoming resistance, by a method probably not employed in the standardization of the scales, since more Kuhlmann-Binet than Merrill-Palmer tests were refused. It will be remembered, however, that four children refused to accept from three to nine of the Kuhlmann-Binet tests at the end of the experiment, whereas only one child remained resistant to one Merrill-Palmer test. Undoubtedly the Kuhlmann-Binet mean would have been somewhat increased if the number of tests which finally remained unattempted had been the same for the Kuhlmann-Binet as for the Merrill-Palmer scale.

The results of Nelson's studies are in accord with the findings in the present investigation in showing that there is a consistent tendency for the same group of children to rate appreciably higher on the Kuhlmann-Binet than on the Merrill-Palmer Scale and that, when the subjects tested are superior, the discrepancy between ratings is markedly increased in favor of the higher rating on the Kuhlmann-Binet Scale.[29]

[29] Nelson, *op. cit.*

XIV

SUMMARY AND CONCLUSIONS

A GROUP of one hundred three-year-old children, all testing at or above 100 I.Q., as measured by the Kuhlmann-Binet Scale, who thus represented the upper half of all children as regards intelligence, equally divided as to sex, with chronological age and mental age approximately the same for the sexes, was studied with respect to: (1) the degree to which resistance affects intelligence test scores; (2) the extent to which such resistance can be overcome; (3) its relation to mental level and the difficulty of the test; (4) the tests most frequently refused.

The findings reported here relate specifically only to a very select group of children, as is designated above.

Thirty-one per cent of the group studied showed no change in Kuhlmann-Binet intelligence quotient as a result of resistance. Of the resistant children finally accepting every test, the increase in Kuhlmann-Binet intelligence quotient points from first to last presentation of the refused tests was as follows: twenty-five to thirty-five points for seven per cent of the children; fifteen to twenty-four points for eighteen per cent of the children; five to fourteen points for twenty-six per cent of the children; one to four points for fourteen per cent of the children.

Seventy per cent of the group showed no change in Merrill-Palmer intelligence quotient points as a result of resistance. Three per cent of the children gained five to fourteen points, and twenty-five per cent gained or lost less than five points from first to final presentation of the refused tests.

More than half the Kuhlmann-Binet tests refused by the children were later passed. Approximately three-fourths of the Merrill-Palmer tests refused by the children were later passed.

Seventy-five per cent of the children resisted one or more tests of the Kuhlmann-Binet Scale on initial presentation; ninety-six per cent of the children finally accepted every test, and four children remained resistant at the end of the experiment.

Sixty-eight per cent of the children resisted one or more Merrill-Palmer tests on initial presentation; ninety-nine per cent finally accepted every test, and one child remained resistant at the end of the experiment.

Combining these results of the Merrill-Palmer and Kuhlmann-Binet Scales, it is found that eighty-four children were resistant to one or more tests on initial presentation; ninety-six per cent finally accepted every test; and four children remained resistant at the end of the experiment.

The more difficult tests were resisted somewhat more frequently than the less difficult tests.

The Merrill-Palmer tests were markedly more acceptable to the group of children studied than were the tests of the Kuhlmann-Binet Scale.

In general, the tests most frequently refused were those which involved a verbal response only, without the use of materials of any kind—particularly mere repetition of numbers and sentences.

A comparison of the various measures of resistance used throughout the study reveals no consistent and significant sex difference.

Resistance, as arbitrarily defined and measured in this study, is very unevenly distributed. Only sixty-five Kuhlmann-Binet and fifty-four Merrill-Palmer resistance scores on tests common to all children were obtained, and within this group the degree of subsequent resistance varied markedly. The trait in its overt manifestation is far from universal, nor does it approximate a normal distribution by any measure used. Our results lead us to agree with Goodenough in concluding that "at least in its overt manifestations, the reaction is one which is highly subject to modification by training."[30]

Some generalizations which grew out of the findings incidental to the main purpose of this study, but which are of interest in the field of mental testing, may be stressed:

On the basis of published data, and of unpublished data in the possession of the present writer, it appears that the variation in intelligence quotients on retests of young children is decidedly greater than has been found to exist with older children. Of the many possible factors that have been set forth to explain this variation, we are here concerned with one, namely, the factor of resistance.

It has been seen that from one-fourth to approximately one-third of the children of the present study accepted every test on initial presentation and that of the tests resisted by the remainder of the group, fifty-eight per cent were finally passed. Therefore, in order to make the intelligence quotients of the non-resistant and resistant groups comparable when no allowance is made for refusals, the resistant group would have to accept every test. On the other hand, repetition of directions in order to overcome resistance might give the resistant children added cues and more aid from the examiner. This factor has not, however, been measured experimentally. It is also known that a variation in one or more mental age months affects the intelligence quotient in inverse ratio to the chronological age; therefore the younger the child, the larger will be the variation in the intelligence quotient caused by any irregularity in the procedure or measure used. Furthermore, it appears that younger children refuse more tests than do older children, and there is some experimental evidence to show that the same child may vary in the amount of resistance manifested at different chronological age levels.

An important factor which needs to be investigated is the exact method followed by various examiners of young children when resistance is encountered, since the findings of the present study show marked increase in the intelligence quotients of resistant children, depending on the number of times refused tests were repeated.

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[30] Goodenough, *op. cit.*, p. 110.

Nelson concluded that the intelligence quotients of eighty per cent of her group were not affected by resistance (Kuhlmann-Binet Scale), and that for the remaining twenty per cent the maximum amount could not be more than from four to twenty intelligence quotient points. These conclusions can be warranted only if Nelson's method is employed of presenting every test refused four times, if it is not accepted sooner.

When the Merrill-Palmer Scale was scored with and without the device which corrects for refusals, and checked by the actual mental age earned by the children when every test of the scale was attempted, the value of the correcting device was clearly demonstrated.

The implications of the foregoing observations are: that refused tests are not the same as failures and should not be treated as such; that a modification of Stutsman's device experimentally determined to correct for refusals of the specific tests or scales for which it is used could probably be applied with profit to all tests for young children; that it is important to have a standardized procedure, including a statement of the maximum number of times directions for each test may be repeated when refusals are encountered.

The present study demonstrated the advantage, in overcoming resistance, of having two test periods on different days. There was a marked and consistent tendency for resistant children to be more coöperative on the second day. For extreme cases the third day was of some value, but probably not of sufficient value to be followed as a routine procedure.

Marked differences in the amount of initial and subsequent resistance evinced for the separate tests point definitely to the importance of evaluating test material from the standpoint of its intrinsic interest to the child. Until we can with greater certainty select such tests, attention should be given to devising tests which permit the examiner to repeat directions without invalidating the test, since children so frequently fail to comply with directions on initial presentation.

The correlation between Merrill-Palmer and Kuhlmann-Binet mental ages of the group studied was .63. The difference between the mental age means, in favor of the higher rating on the Kuhlmann-Binet Scale, was found to be significant. It is suggested that this difference is due in part to the fact that the Merrill-Palmer Scale was standardized to a large extent on *volunteered* children who have been found to test above average in intelligence.

The discrepancy between intelligence ratings on the Merrill-Palmer and Kuhlmann-Binet Scales, in favor of the higher rating on the Kuhlmann-Binet, increased markedly above 120 intelligence quotient.

Children volunteered and obtained by invitation for testing constitute a superior group, as measured in terms of both intelligence quotient and occupational status of the parents.

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APPENDIX A

RESPONSES MADE BY 84 RESISTANT CHILDREN WHEN NOT ATTEMPTING THE TESTS OF THE KUHLMANN-BINET AND MERRILL-PALMER SCALES COMBINED, AND NUMBER OF CHILDREN MAKING EACH RESPONSE

	Responses		Number of Children
	Total	Per Cent	
Silent	686	42.1	53
Verbal Responses			
Direct Verbal Refusals			
"I can't."	73		16
"I can't say it."	10		4
"I can't get them in."	1		1
"I can't do it."	2		2
"I can't say that very much."	1		1
"I can't say that."	3		3
"I can't do that."	2		1
"See it can't."	1		1
"It can't."	1		1
"I can't hear you." (Puts hands over ears.)	1		1
"No, I don't do that."	1		1
"I don't want to say that."	26		9
"I don't want to."	23		10
"I don't want to do it."	1		1
"I don't want to do it any more."	2		1
"I don't want to build with cubes."	1		1
"I don't know."	83		36
"I don't know what is a fork."	1		1
"No."	211		28
"No, I will not."	1		1
"I won't say that."	1		1
"I won't."	5		3
"Won't do it."	1		1
"I won't tell you."	4		1
"No, I am not going to cut it."	1		1
"No more."	3		1
"Not another time."	1		1

	Responses		Number of Children
	Total	Per Cent	
"I can't, I talk to Mama."			1
"My mother told me how, but I don't know which."	1		1
"That's all."	3		1
"I am not."	1		1
"That's all for that."	2		1
"No, I want to do it."	1		1
	468	28.7	
Relevant Remarks (Related to something in the room or to task at hand)			
"Two new steps."	1		1
"You get it."	1		1
"Nothing."	1		1
"Did say a lot."	1		1
"Like a big girls I'll do it and then go."	1		1
"I say it up to the house."	1		1
"My name up to the house."	1		1
"I will show you."	1		1
"I did say it."	1		1
"A fork and a knife I have at home."	1		1
"My fork—I have a fork."	1		1
"It was something."	1		1
"I forgot."	3		1
"No pencil." [Offered pencil for test.]	1		1
"There it is, I told you."	1		1
"Little boxes." [Sees boxes on stand.]	1		1
"Look what's here."	1		1
"There, and there it goes."	1		1
"My mother was here already."	1		1
"I did that."	1		1
"Fine."	1		1
"I find the chair."	1		1
"Look what I do."	1		1
"I put it in again."	1		1
"This is a train."	1		1
"Has a hat on."	1		1
"See my pretty dress."	4		2
"Choo-choo."	3		1
"That's a bird."	2		1
"See that boy."	1		1
"Oh, look at the blocks."	1		1

	Responses		Number of Children
	Total	Per Cent	
"I pull my chair over."	1		1
"This makes me mad."	1		1
"I see a choo-choo."	1		1
"I am holding him."	1		1
"I am holding with both hands."	1		1
Including Direct Verbal Refusals			
"No, I don't think my mother'd like me to."	1		1
"No, fingers." [Hands behind her.]	1		1
"No, let's do that one."	1		1
"No, want this one."	1		1
"No, I want that one."	1		1
"No, I like this one."	3		1
"No, the other one."	1		
	53	3·3	
Suggests Other Material or Idea			
"Let's play this." [Points to other material.]	1		1
"I want the other blocks."	1		1
"I want those blocks."	1		1
"Want the others."	1		1
"I want that one."	1		1
"I want that red box."	1		1
"I want another one."	2		2
"I want this."	1		1
"I want the blocks."	2		2
"I want the boxes."	1		1
"I want the box."	1		1
"I want that."	3		3
"See, I want to do this."	1		1
"I want that one."	2		1
"I want this to carry."	1		1
"I want the stool."	1		1
"I want the car."	1		1
"I want the dolly."	1		1
"I want to see the bell."	1		1
"Nice, that's what I want there."	1		1
"I want to see these things."	1		1
"I want that."	1		1
"I want them."	1		1
"You give me the other block."	2		1
"I am doing this now." [Builds with blocks.]	1		1
"Give me the ball."	1		1

	Responses		Number of Children
	Total	Per Cent	
"Give me that please."	1		1
"Get doll."	1		1
"I'll do that—that big one."	1		1
"Let's take the little box now."	1		1
"Give them in that box."	1		1
"Let me." [Do something else.]	1		1
"I want to do it." [Meaning something else]	1		1
(Including Direct Verbal Refusals)			
"No, I'm going to put that in [the box] again."	1		1
"No, let's play the blocks first."	1		1
"No, I want that one."	2		2
"No, this." [Points.]	1		1
"No, let's do that one."	1		1
"No, want this one."	1		1
"No, I am going to take them all." [Collects cards.]	1		1
"No, I like this."	1		1
"No, I want that one." [Pushes material away.]	1		1
"No, it's a doll I want."	1		1
"No, the other one."	1		1
"No, those." [Points.]	1		
	52	3.2	
Suggests Use of Material in Other Ways			
"I am going to put the blocks back."	1		1
"I am going to make a fireplace this time."	1		1
"I make a choo-choo here." [Makes it.]	1		1
"I am going to make a train."	1		1
"I have to build a house."	1		1
"I am going to make one like this."	1		1
"I am going to play with these."	1		1
"I make some trains."	1		1
"I made a house."	1		1
"I'll have a house."	1		1
"I build a train."	6		4
"I am going to make a house and a garage."	1		1
"I want to make a train."	5		3
"Choo-choo-choo."	1		1
(Including Direct Verbal Refusals)			
"No, let me."	1		1
"No, choo-choo." [Makes it.]	1		1

	Responses		Number of Children
	Total	Per Cent	
"No, choo-choo-choo-choo." [Makes it.]	1		1
"No, I am going to make a higher one."	1		1
"No, choo-choo-choo."	1		1
"I am not [going to do it] choo-choo train."	1		1
"No, I want to make a house."	4		3
	34	2.7	
Suggests Delay			
"After a while."	1		1
"I don't want the blocks now, later."	1		1
"I'll play that later."	3		3
"Ask for that later."	1		1
"Wait and I'll tell you."	1		1
"I am busy."	1		1
"I want to go with mother—later."	1		1
"A little later."	1		1
"Not now."	1		1
"Later."	1		1
"Not yet."	1		1
(Including Direct Verbal Refusals)			
"No, after I try this." [Building with blocks.]	1		1
"No, not now, let's do this."	1		1
"No, not now."	8		4
"No, a little later."	1		1
"No, after a while."	1		1
"No, not yet."	1		1
	27	1.6	
Questions			
"Where's daddy?"	1		1
"Where is the blue box?"	1		1
"What is in that box?"	1		1
"Whose box?" [Reaches for the box.]	1		1
"What's that thing I see, that one?"	1		1
"What are they up there?"	1		1
"Why?"	1		1
"What for?"	7		3
"What, what?"	1		1
"What is this?"	1		1
"What is it for?"	1		1
"What's in it?"	1		1

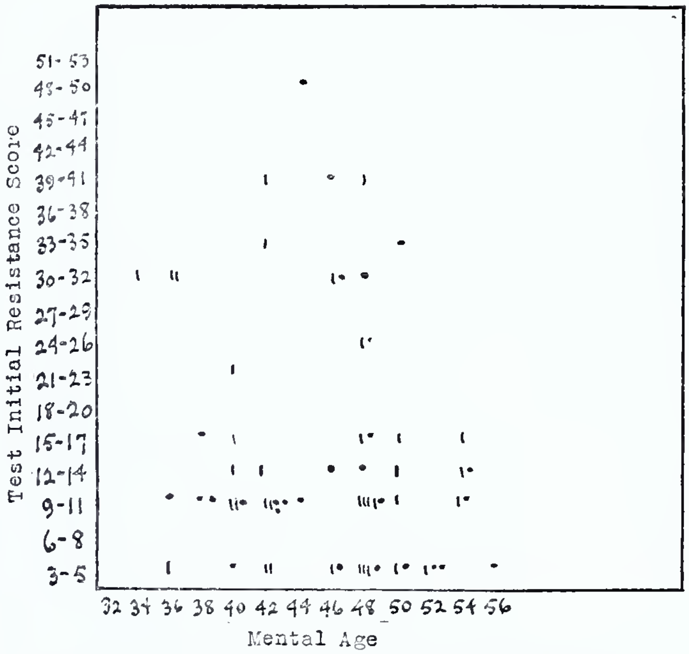
	Responses		Number o Childre
	Total	Per Cent	
"Where's mother?"	1		1
"Where is the other one?"	1		1
"Where does this belong?"	1		1
"What is this in the school? Why do you have the lights on?"	1		1
(Including Direct Verbal Refusals)			
"No, what's that?"	1		1
	23	1.4	
Apparently Irrelevant			
"Yes."	6		5
"I have a sun suit."	1		1
"I lost my rings."	1		1
"You make an elephant."	1		1
"Nobody was there."	1		1
"Yes, yes, yes."	1		1
"My daddy makes a dog and a cat."	1		1
"I have a pistol."	1		1
"My brother's coming here."	1		1
"I rock a horse."	1		1
"I want daddy."	2		1
"I want to see an airship."	1		1
"I want to wee-wee."	1		1
"Be it."	1		1
(Including Direct Verbal Refusals)			
"I can't—my mother got a cane."	1		1
	21	1.1	
Unintelligible			
Unintelligible	1		1
"Hugh."	5		1
"Wa-wa-wa."	6		2
"High-hi."	1		1
	13	.8	
Suggests Removal			
"Let's put this up here."	1		1
"Take this away."	3		1
"I don't want that. Take it away."	1		1
"You take this one away."	1		1

	Responses		Number of Children
	Total	Per Cent	
"This go up."	1		1
	7	.4	
Asks for Help			
"You do it."	1		1
"You say it."	4		1
	5	.3	
Destructive Attitude			
"I knock them over."	1		1
"I will tear it." [Paper for folding.]	2		1
	3	.2	
Motor Responses			
Escape			
Runs away	3		1
Walks away	142		17
Walks out of room	2		1
Goes to window	1		1
Runs out of room	1		1
	149	8.5	
Uses Material in Other Ways Than Directed			
Builds with blocks	31		7
Builds with cubes	1		1
Pats paper	1		1
Pounds paper	2		1
Makes design with blocks	1		1
Piles Seguin forms on board	1		1
Bangs blocks	1		1
Makes train	3		1
Writes with crayon	1		1
Collects blocks and holds them	1		1
Puts pegs in board	1		1
Manipulation of blocks	1		1
Puts pile of blocks away	1		1
	46	2.8	
Pushes Material Away	33	2.2	

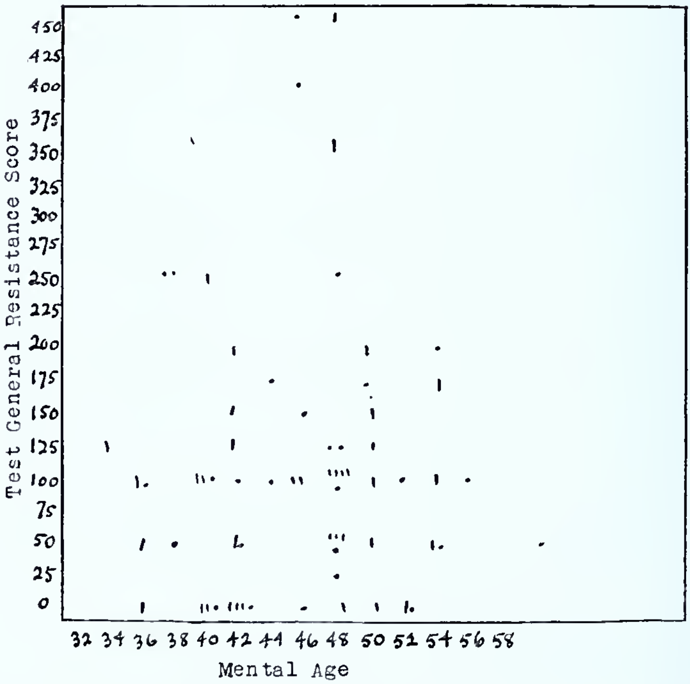
	Responses		Number of Children
	Total	Per Cent	
Goes After Other Material			
Goes for other material	4		1
Grabs blocks	2		1
Puts stool on table, plays with stool	1		1
	7	.4	
Destructive Behavior			
Knocks model down	1		1
Scatters blocks and goes to window	1		1
	2	.01	
Shakes Head	2	.01	2

APPENDIX B

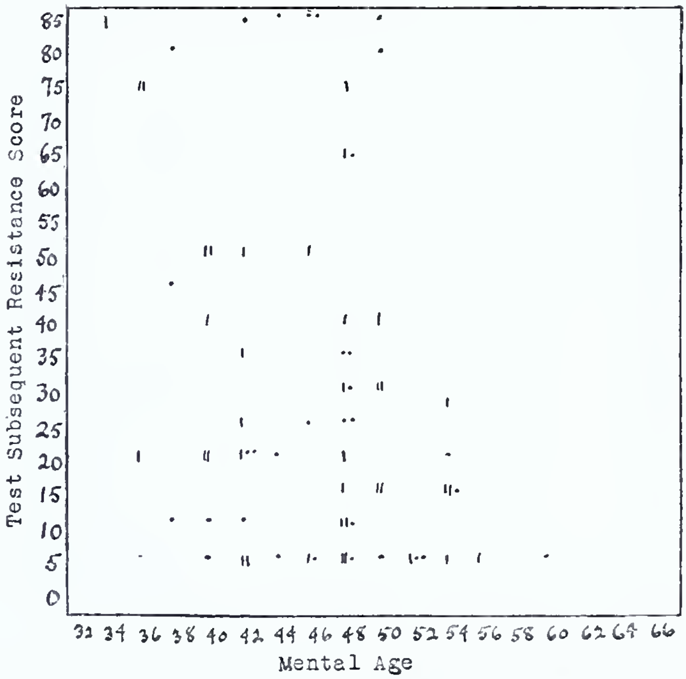
SCATTER DIAGRAMS 1, 2, AND 3; RESISTANCE SCORES AND MENTAL AGE



Correlation Between Initial Resistance Score and Mental Age—Kuhlmann-Binet Scale (Data from Table XV)



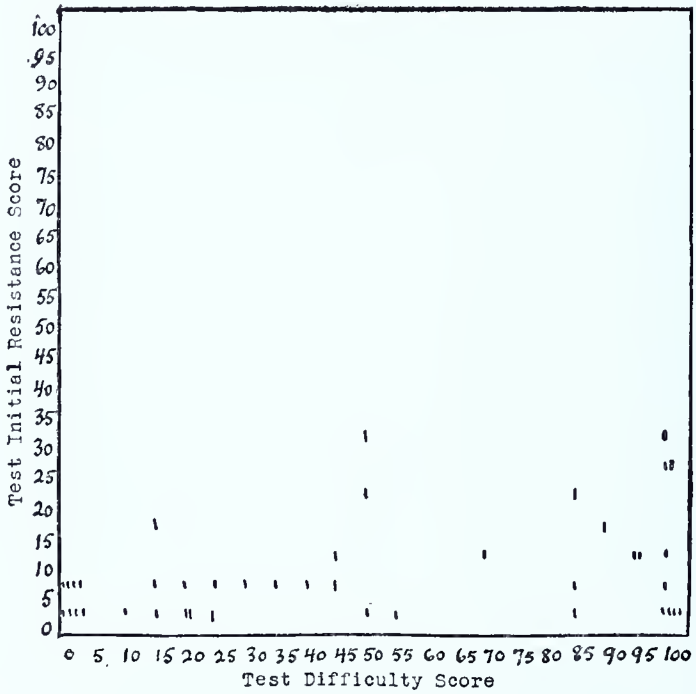
Correlation Between Test Subsequent Resistance Score and Mental Age—Kuhlmann-Binet Scale (Data from Table XV)



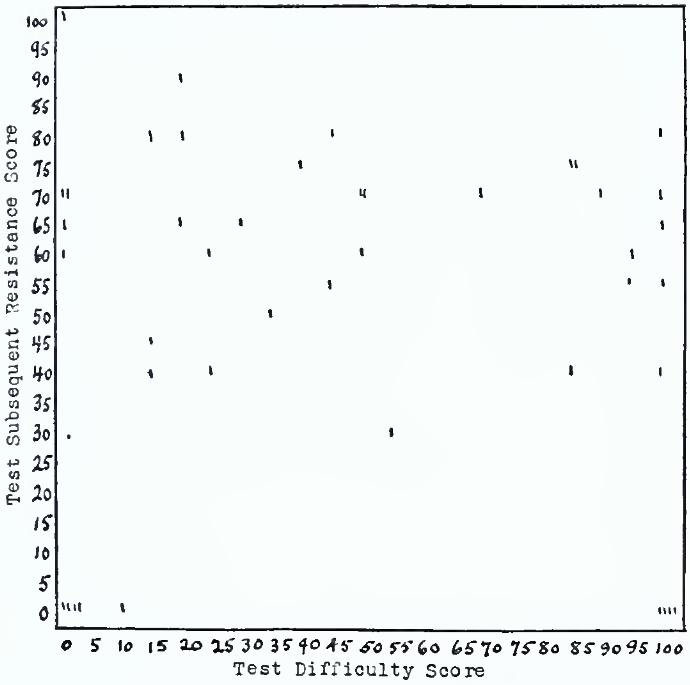
Correlation Between General Resistance Score and Mental Age—Kuhlmann-Binet Scale (Data from Table XV)

APPENDIX C

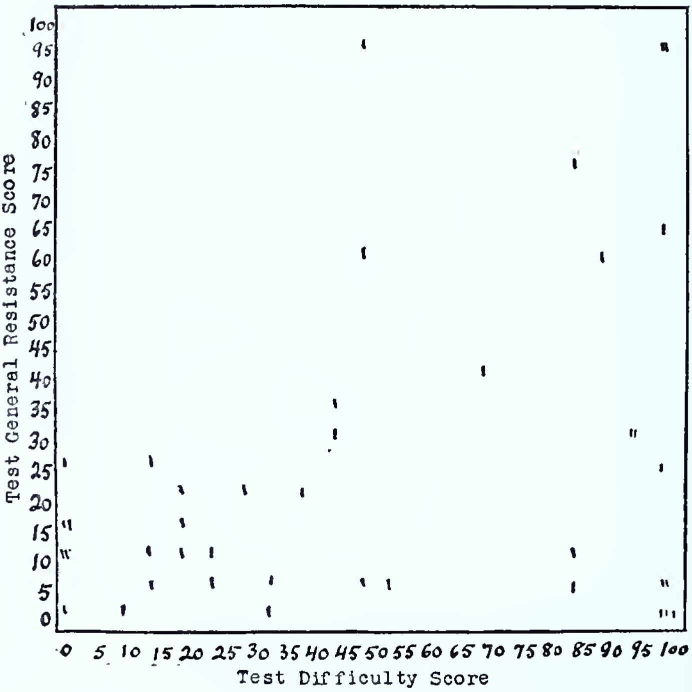
SCATTER DIAGRAMS 4, 5, AND 6; RESISTANCE SCORES AND DIFFICULTY SCORES



Correlation Between Test Initial Resistance Score and Test Difficulty Score (Data from Table XVIII)



Correlation Between Test Subsequent Resistance Score and Difficulty Score (Data from Table XVIII)



Correlation Between Test General Resistance Score and Test Difficulty Score (Data from Table XVIII)

VITA

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Child Development Monographs
Monograph No. 4

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